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ABSTRACT

This guide presents the standard curriculum for technical institutes in Georgia. The curriculum addresses the minimum competencies for a radiologic technology program. The guide contains four major sections. The General Information section contains an introduction giving an overview and defining purpose and objectives; a program description, including admissions, typical job titles, and accreditation and certification requirements; and a curriculum model, including standard curriculum sequence and lists of courses. The next three sections describe the courses under the following categories: General Core Courses (English, algebraic concepts, interpersonal relations and professional development); Fundamental Technical Courses (anatomy and physiology, medical terminology, introduction to radiography, radiographic procedures I-II, principles of radiographic exposure I, radiologic science I, introductory clinical radiography I-II); and Specific Technical Courses (radiographic procedures III-IV, radiologic science II, radiographic exposure II, radiographic imaging equipment, special radiographic procedures, radiographic pathology, radiation biology and protection, review, intermediate clinical radiography I-III, and advanced clinical radiography I-II). Each course entry consists of the following: course overview (description, competency areas, prerequisites, credit hours, contact hours); course outline with student objectives and class and lab hours; and resource list. An equipment list is appended. (YLB)

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GEORGIA DEPARTMENT OF TECHNICAL
AND ADULT EDUCATION

RADIOLOGIC TECHNOLOGY
PROGRAM GUIDE

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RADIOLOGIC TECHNOLOGY PROGRAM GUIDE

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RADIOLOGIC TECHNOLOGY PROGRAM GUIDE

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HOW TO USE THIS MANUAL

Summary

This manual is divided into:

Tabs - major divisions, physically separated by numbered tab dividers

Sections - divisions within a tab

Subjects - divisions within a section

Numbering System

Each document (Subject) has a unique 6-digit number. This number is divided into 3 sets of 2 digits which are separated by dashes.

Example: 04 - 02 - 03
TAB SECTION SUBJECT

Locating a Document

Document numbers appear on the upper right hand corner of each page (see top of this page). To locate a subject:

1. Refer to the Table of Contents.
2. Note the document number for the subject.

   Example: 04-02-03

3. Turn to the tab divider marked 04 and within this tab find Section 02 and Subject 03.

Table of Contents

The table of contents (00-00-01) is intended to give a cover-to-cover overview of the manual contents and organization. It lists contents of a Tab to the Section and Subject level.

Amendments

Registered manual holders are instructed to keep their manuals up-to-date.

Manuals Document Transmittal	All new or revised documents are sent to the registered holder of the manual and are recorded on a Manuals Document Transmittal Form. Transmittals are numbered consecutively, and instructions for use are printed on the form.
Amendment Record	The registered holder of the manual records the receipt of all manual document transmittals on the Amendment Record. This record and instructions are found on the reverse side of the manual title page.

GENERAL INFORMATION

Introduction

Overview

Radiologic Technology is a program of study which is compatible with the policies of the Georgia Board of Technical and Adult Education and encourages each Radiologic Technology program student to benefit and contribute as a partner in the economic development and stability of Georgia. The philosophy of the Radiologic Technology program is founded on the value attributed to individual students, the radiography profession, and technical education.

The Radiologic Technology program of study is consistent with the philosophy and purpose of the institution. The program provides academic foundations in communications, mathematics, and human relations, as well as technical fundamentals. Program graduates are trained in the underlying fundamentals of radiologic technology and are well prepared for employment and subsequent upward mobility.

The Radiologic Technology program is a technical program that provides the knowledge and skills to qualify participants as radiographers. This profession is presently experiencing technical growth and the employment market is experiencing shortages of trained radiographers. Upon completion of the Radiologic Technology program, students are eligible to sit for a national certification examination thus enabling them to achieve professional employment in the field.

The program structure acknowledges individual differences and provides opportunities for students to seek fulfillment of their respective educational goals. The program does not discriminate on the basis of race, color, national origin, religion, sex, handicapping condition, academic disadvantage, or economic disadvantage.

To assist each student to attain his or her respective potential within the program, both the instructor and the student incur an obligation in the learning process. The instructor is a manager of instructional resources and organizes instruction in a manner which promotes learning. The student assumes responsibility for learning by actively participating in the learning process.

This is a dynamic field which requires attention to current curriculum and up-to-date instructional equipment. The Radiologic Technology program must promote the concept of change as the profession evolves. The need for nurturing the spirit of involvement and lifelong learning is paramount in the radiography profession.

GENERAL INFORMATION

Introduction

Standard Curriculum

The Radiologic Technology program guide presents the standard radiologic technology curriculum for technical institutes in Georgia. This curriculum addresses the minimum competencies for the Radiologic Technology program. The competency areas included in a local Radiologic Technology program may exceed what is contained in this program guide, but it must encompass the minimum competencies contained herein.

As changes occur in the Radiologic Technology program, this guide will be revised to reflect those changes. Proposed changes are first evaluated and approved by the local program advisory committee and then forwarded to the State Technical Committee for approval and inclusion in the state standard program guide.

This program guide is designed to relate primarily to the development of those skills needed by individuals in the radiography profession, such as radiographic positioning and exposure techniques; radiation biology and protection; and radiographic anatomy, physiology, and pathology.

GENERAL INFORMATION

Introduction

Developmental Process

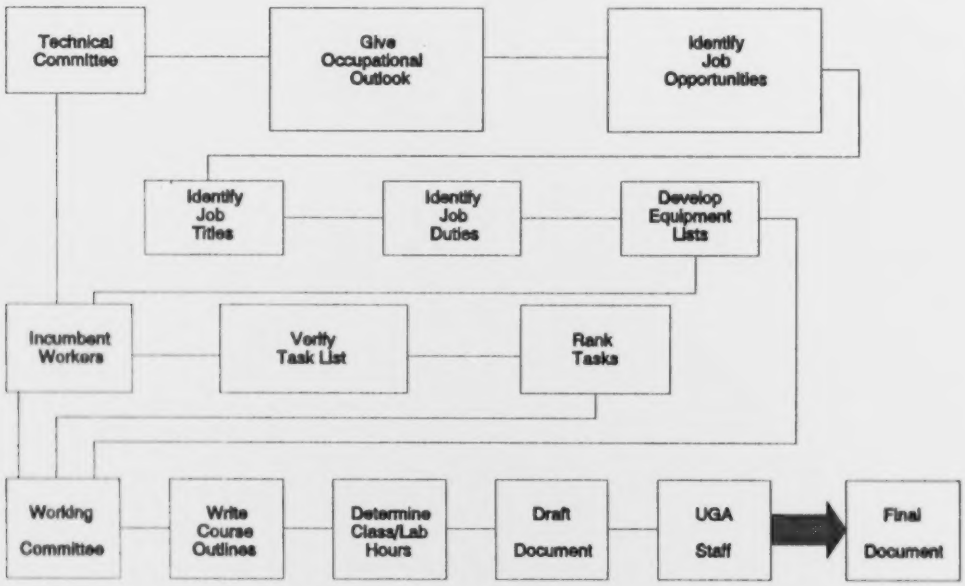
The development of the Radiologic Technology program guide was based on the premise that the people in the industry can best determine program needs. With this in mind, representatives from businesses which would employ program graduates were asked to serve on a State Technical Committee to help identify the technical content and to provide overall guidance to ensure that the resulting program would produce graduates qualified for entry-level occupational positions in the industry.

The State Technical Committee verified an occupational task list that had been compiled through extensive research. These representatives included workers who had actually performed the duties and tasks being verified.

Technical institutes which would implement the curriculum were also included in the developmental effort. Representatives from the technical institutes provided the expertise in teaching methodology unique to each discipline and developed the courses contained in this program guide.

The University of Georgia coordinated and directed the development of the curriculum and produced the final program guide. The role of each group in the developmental process is shown in the diagram on the following page.

DATA/PROCESS FLOW DIAGRAM



GENERAL INFORMATION

Introduction

Purpose and Objectives

Purpose

The purpose of the Radiologic Technology program is to provide educational opportunities to individuals that will enable them to obtain the knowledge, skills, and attitudes necessary to succeed as radiographers.

The Radiologic Technology program provides educational opportunities regardless of race, color, national origin, religion, sex, age, handicapping condition, academic disadvantage, or economic disadvantage.

The Radiologic Technology program graduates are eligible to sit for a national certification examination for radiographers and are prepared to function as professionals in the radiography profession. Program graduates are to be competent in the general areas of communications, algebra, interpersonal relations, and anatomy and physiology. Program graduates are competent to perform imaging examinations and accompanying responsibilities assigned to a radiographer at the direction of physicians qualified to request and/or perform radiographic procedures. Upon completion of the program, the graduate is competent to perform as a radiographer and to:

1. Apply knowledge of anatomy, physiology, positioning, and radiographic techniques to accurately demonstrate anatomical structures on a radiograph or other imaging receptor.

2. Determine exposure factors to achieve optimum radiographic techniques with minimum radiation exposure to the patient.

3. Evaluate radiographic images for appropriate positioning and image quality.

4. Apply the principles of radiation protection for the patient, self, and others.

5. Provide patient care and comfort.

6. Recognize emergency patient conditions and initiate life-saving first aid and basic life-support procedures.

7. Evaluate the performance of radiologic systems, know the safe limits of equipment operation, and report malfunctions to the proper authority.

8. Exercise independent judgment and discretion in the technical performance of medical imaging procedures.

9. Participate in radiographic quality assurance programs.

Objectives

1. Provide current curriculum, instructional materials, and equipment (in accordance with available funding) which teach knowledge, skills, and attitudes appropriate to industry needs.

2. Provide educational facilities which foster learning and provide safe, healthy environments available and accessible to all students who can benefit from the program.

3. Provide academic instruction which supports effective learning within the program and which enhances professional performance on the job.

4. Provide employability skills which foster work attitudes and work habits that will enable graduates of the program to perform as good employees.

5. Nurture the desire for learning so that graduates will pursue their own continuing education as a lifelong endeavor.

6. Provide an educational atmosphere which promotes a positive self image and a sense of personal well being.

7. Provide education that fosters development of good safety habits.

8. Provide admission, educational, and placement services without regard to race, color, national origin, religion, sex, age, or handicapping condition.

9. Provide information to the public regarding the program that will facilitate recruitment and enrollment of students.

10. Promote good public relations via contacts and regular communications with business, industry, and the public sector.

11. Promote faculty and student rapport and communications to enhance student success in the program.

GENERAL INFORMATION

Program Description

Program Defined

The Radiologic Technology program is a sequence of courses that prepares students for positions in radiography departments and related businesses and industries. Learning opportunities develop academic, technical, and professional knowledge and skills required for job acquisition, retention, and advancement. The program emphasizes a combination of didactic and clinical instruction necessary for successful employment. Program graduates receive a Radiologic Technology diploma, have the qualifications of a radiographer, and are eligible to sit for a national certification examination for radiographers.

GENERAL INFORMATION

Program Description

Admissions

Admissions Requirements

Admission of new students to the Radiologic Technology program is contingent upon their meeting all of the following requirements:

a) attainment of 17 or more years of age;
b) documentation of high school graduation or satisfaction of High School Equivalency Certificate requirements;
c) achievement of the 10th grade level in reading, English, and math as shown on a statistically validated test or minimum SAT scores of 380 verbal and 380 math;
d) documentation of a physical examination; and
e) completion of application and related procedures.

Admission of transfer students is contingent upon their meeting the following:

a) regular admission and good standing at a regionally accredited diploma or degree granting institution; and
b) proper completion of application and related procedures.

Provisional Admission

A new student who does not meet the regular admission requirements of the program may be admitted on a provisional basis. The requirements for provisional admission are:

a) attainment of 17 or more years of age;
b) achievement of the 9th grade level in reading, English, and math as shown on a statistically validated test or recommendation by program faculty and designated admissions personnel on the basis of interview and assessment of student potential;
c) documentation of a physical examination; and
d) completion of application and related procedures.

GENERAL INFORMATION

Program Description

Typical Job Titles

The Radiologic Technology program is assigned a (PGM) CIP code of (PGM) 17.0209 and is consistent with all other programs throughout the state which have the same (PGM) CIP code. The related D.O.T. job title follows:

078.362-026	Radiologic Technologist

GENERAL INFORMATION

Program Description

Accreditation and Certification

This program must conform to the institutional accreditation requirements of the Southern Association of Colleges and Schools by meeting Commission on Colleges (COC) or Commission on Occupational Education Institutions (COEI) accreditation requirements and must not conflict with the accreditation criteria established by COC and COEI.

This program addresses the requirements stated in the *Curriculum Guide for Radiography Programs* (1983 or current edition), published by The American Society of Radiologic Technologists.

Radiologic Technology programs are accredited by the Committee on Allied Health Education Accreditation of the American Medical Association.

GENERAL INFORMATION

Curriculum Model

Standard Curriculum

The standard curriculum for the Radiologic Technology program is set up on the quarter system. Technical institutes may implement the Radiologic Technology program using one of the sequences listed below or by using a locally developed sequence designed to reflect course prerequisites and/or corequisites.

Course	Class Hours	Lab Hours	Weekly Contact Hours	Credits
SUGGESTED SEQUENCE I				
FIRST QUARTER				
AHS 101 Anatomy and Physiology	5	0	5	5
AHS 109 Medical Terminology for Allied Health Sciences	3	0	3	3
ENG 101 English	5	0	5	5
MAT 103 Algebraic Concepts	5	0	5	5
RAD 101 Introduction to Radiography	5	1	6	5
RAD 104 Radiographic Procedures I	2	3	5	3
	25	4	29	26

Course	Class Hours	Lab Hours	Weekly Contact Hours	Credits
SECOND QUARTER				
PSY 100 Interpersonal Relations and Professional Development	3	0	3	3
RAD 106 Radiographic Procedures II	2	3	5	3
RAD 107 Principles of Radiographic Exposure I	3	2	5	3
RAD 132 Introductory Clinical Radiography I	0	14	14	4
	8	19	27	13
THIRD QUARTER				
RAD 109 Radiographic Procedures III	3	1	4	3
RAD 111 Radiologic Science I	5	0	5	5
RAD 116 Principles of Radiographic Exposure II	2	1	3	2
RAD 133 Introductory Clinical Radiography II	0	21	21	7
	10	24	33	17
FOURTH QUARTER				
RAD 113 Radiographic Procedures IV	2	1	3	2
RAD 114 Radiologic Science II	2	0	2	2
RAD 119 Radiographic Pathology	2	1	3	2
RAD 134 Intermediate Clinical Radiography I	0	21	21	7
	6	23	29	13

Course	Class Hours	Lab Hours	Weekly Contact Hours	Credits
FIFTH QUARTER				
RAD 117 Radiographic Imaging Equipment	3	3	6	4
RAD 118 Special Radiographic Procedures	3	1	4	3
RAD 135 Intermediate Clinical Radiography II	0	21	21	7
	6	25	31	14
SIXTH QUARTER				
RAD 120 Principles of Radiation Biology and Protection	5	0	5	5
RAD 136 Intermediate Clinical Radiography III	0	21	21	7
	5	21	26	12
SEVENTH QUARTER				
RAD 137 Advanced Clinical Radiography I	0	28	28	9
XXX xxx Technical or Technically Related Electives	-	-	-	6
	0	28	28	15

Course	Class Hours	Lab Hours	Weekly Contact Hours	Credits
EIGHTH QUARTER				
RAD 126 Radiologic Technology Review	2	2	4	3
RAD 138 Advanced Clinical Radiography II	0	28	28	9
	2	30	32	12

Course	Class Hours	Lab Hours	Weekly Contact Hours	Credits
SUGGESTED SEQUENCE II				
FIRST QUARTER				
AHS 101 Anatomy and Physiology	5	0	5	5
AHS 109 Medical Terminology for Allied Health Sciences	3	0	3	3
MAT 103 Algebraic Concepts	5	0	5	5
RAD 101 Introduction to Radiology	5	1	6	5
RAD 104 Radiographic Procedures I	2	3	5	3
RAD 120 Principles of Radiation Biology and Protection	5	0	5	5
	25	4	29	26
SECOND QUARTER				
RAD 106 Radiographic Procedures II	2	3	5	3
RAD 107 Principles of Radiographic Exposure I	3	2	5	3
RAD 111 Radiologic Science I	5	0	5	5
RAD 132 Introductory Clinical Radiography I	0	14	14	4
	10	19	29	15

Course	Class Hours	Lab Hours	Weekly Contact Hours	Credits
THIRD QUARTER				
RAD 109 Radiographic Procedures III	3	1	4	3
RAD 114 Radiologic Science II	2	0	2	2
RAD 116 Principles of Radiographic Exposure II	2	1	3	2
RAD 133 Introductory Clinical Radiography II	0	21	21	7
	7	23	30	14
FOURTH QUARTER				
RAD 113 Radiographic Procedures IV	2	1	3	2
RAD 117 Radiographic Imaging Equipment	3	3	6	4
RAD 134 Intermediate Clinical Radiography I	0	21	21	7
	5	25	30	13
FIFTH QUARTER				
ENG 101 English	5	0	5	5
RAD 118 Special Radiographic Procedures	3	1	4	3
RAD 135 Intermediate Clinical Radiography II	0	21	21	7
	8	22	30	15

Course	Class Hours	Lab Hours	Weekly Contact Hours	Credits
SIXTH QUARTER				
PSY 100 Interpersonal Relations and Professional Development	3	0	3	3
RAD 119 Radiographic Pathology	2	1	3	2
RAD 136 Intermediate Clinical Radiography III	0	21	21	7
XXX xxx Technical or Technically Related Electives	-	-	-	3
	5	22	27	15
SEVENTH QUARTER				
RAD 137 Advanced Clinical Radiography I	0	28	28	9
XXX xxx Technical or Technically Related Electives	-	-	-	3
	0	28	28	12
EIGHTH QUARTER				
RAD 126 Radiologic Technology Review	2	2	4	3
RAD 138 Advanced Clinical Radiography II	0	28	28	9
	2	30	32	12

GENERAL INFORMATION

Curriculum Model

General Core Courses

The general core courses provide students with a foundation in the basic skills which enable them to express themselves more clearly, both orally and in writing, and to perform the mathematical functions required in this profession. The general core courses for the Radiologic Technology program are listed below.

ENG	101	English	5 Credits
MAT	103	Algebraic Concepts	5 Credits
PSY	100	Interpersonal Relations and Professional Development	3 Credits

GENERAL INFORMATION

Curriculum Model

Fundamental Technical Courses

The fundamental technical courses provide students with a foundation in the areas of anatomy and physiology, medical terminology, and radiography, which are needed to progress to the more highly specialized courses in radiography. The fundamental technical courses are listed below.

AHS	101	Anatomy and Physiology	5 Credits
AHS	109	Medical Terminology for Allied Health Sciences	3 Credits
RAD	101	Introduction to Radiography	5 Credits
RAD	104	Radiographic Procedures I	3 Credits
RAD	106	Radiographic Procedures II	3 Credits
RAD	107	Principles of Radiographic Exposure I	3 Credits
RAD	111	Radiologic Science I	5 Credits
RAD	132	Introductory Clinical Radiography I	4 Credits
RAD	133	Introductory Clinical Radiography II	7 Credits

GENERAL INFORMATION

Curriculum Model

Specific Technical Courses

The specific technical courses build upon the fundamental technical courses to provide students with the basic knowledge and skill required to work as radiographers. The specific technical courses offered in the Radiologic Technology program are listed below.

RAD 109	Radiographic Procedures III	3 Credits
RAD 113	Radiographic Procedures IV	2 Credits
RAD 114	Radiologic Science II	2 Credits
RAD 116	Principles of Radiographic Exposure II	2 Credits
RAD 117	Radiographic Imaging Equipment	4 Credits
RAD 118	Special Radiographic Procedures	3 Credits
RAD 119	Radiographic Pathology	2 Credits
RAD 120	Principles of Radiation Biology and Protection	5 Credits
RAD 126	Radiologic Technology Review	3 Credits
RAD 134	Intermediate Clinical Radiography I	7 Credits
RAD 135	Intermediate Clinical Radiography II	7 Credits
RAD 136	Intermediate Clinical Radiography III	7 Credits
RAD 137	Advanced Clinical Radiography I	9 Credits
RAD 138	Advanced Clinical Radiography II	9 Credits

GENERAL INFORMATION

Curriculum Model

Electives

Elective courses are provided to allow for the different levels of prior knowledge and skills brought to the classroom by students with diverse backgrounds, educational attainment, and specialized interests.

Decisions regarding the selection and appropriateness of any elective are made by the student after consultation with the instructor. Courses from other departments may be taken as electives when considered appropriate for a student's academic circumstances and career goals.

GENERAL CORE

ENG 101 - English

Course Overview

Course Description

Emphasizes the development and improvement of written and oral communication abilities. Topics include: analysis of writing techniques used in selected readings, writing practice, editing and proofreading, research skills, and oral presentation skills. Homework assignments reinforce classroom learning.

Competency Areas

Analysis of Writing Techniques
Used in Selected Readings
Writing Practice
Editing and Proofreading
Research Skills
Oral Presentation Skills

Prerequisite

Program admission level English and reading competency

Credit Hours

5

Contact Hours Per Week

Class - 5

Lab - 0

GENERAL CORE

ENG 101 - English

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
ANALYSIS OF WRITING TECHNIQUES USED IN SELECTED READINGS		**10**	**0**
Review and analysis of various writing techniques	Read and analyze writing to identify subject and focus. Read and analyze writing to identify supporting information. Read and analyze writing to identify patterns of development, such as time, space, climax, example, process, instructions, definition, comparison/ contrast, cause and effect, classification, and problem-solving.		
WRITING PRACTICE		**20**	**0**
Review of grammar fundamentals	Produce logically organized, grammatically acceptable writing.		
Review of composition fundamentals	Compose a variety of paragraphs, reports, memoranda, and business letters. Demonstrate listening skills by following directions for writing assignments.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
EDITING AND PROOFREADING		**10**	**0**
Review of editing fundamentals	Revise to improve ideas, style, organization, and format, preferably with word processing. Edit to improve grammar, mechanics, and spelling.		
RESEARCH SKILLS		**5**	**0**
Resource materials location and utilization	Utilize library resources to enhance writing.		
ORAL PRESENTATION SKILLS		**5**	**0**
Types of oral presentation participation	Participate in class discussion, small group discussion, and/or individual presentations.		
Role of the listener	Participate as an active listener.		

GENERAL CORE

ENG 101 - English

Resources

Lewis, S. D., Smith, H., Baker, F., Ellegood, G., Kopay, C., & Tanzer, W. (1988). *Writing skills for technical students* (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.

Van Alstyne, J. S. (1985). *Professional and technical writing strategies*. Englewood Cliffs, NJ: Prentice Hall.

GENERAL CORE

MAT 103 - Algebraic Concepts

Course Overview

Course Description

Introduces concepts and operations which can be applied to the study of algebra. Topics include: a review of arithmetic, signed numbers, order of operations, unknowns and variables, algebraic expressions, equations and formulas, and graphs. Class includes lecture, applications, and homework to reinforce learning.

Competency Areas

Basic Mathematical Concepts
Basic Algebraic Concepts

Prerequisite

Program admission level math competency

Credit Hours

5

Contact Hours Per Week

Class - 5

Lab - 0

GENERAL CORE

MAT 103 - Algebraic Concepts

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
BASIC MATHEMATICAL CONCEPTS		**15**	**0**
Review of arithmetic	Perform mathematical calculations using whole numbers, fractions, decimals, and percents. Solve problems using exponents and radicals. Use a calculator to perform basic mathematical operations to solve problems.		
BASIC ALGEBRAIC CONCEPTS		**35**	**0**
Signed numbers	Identify signed numbers, absolute values, and scientific notation. Perform basic operations using signed numbers. Use signed numbers in elementary applications.		
Order of operations	List the hierarchy of operations. Apply hierarchy of operations to solve mathematical problems requiring multiple operations.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Unknowns and variables	Define unknowns and variables.		
	Recognize the difference between factors and terms.		
Algebraic expressions	Recognize literal expressions and terms.		
	Perform addition, subtraction, multiplication, and division of algebraic expressions.		
	Factor algebraic expressions.		
	Simplify algebraic expressions.		
Equations, formulas, and graphs	Solve linear equations of one unknown using numerical calculations, approximation, and graphs.		
	Solve a formula for a designated unknown.		
	Use formulas to solve applied problems under given conditions.		
	Solve applied problems using equations.		
	Solve linear equations of two unknowns using simultaneous equations, substitution, and graphing.		
	Solve linear equations of two and three unknowns using determinants.		

GENERAL CORE

MAT 103 - Algebraic Concepts

Resources

Harter, J. J., & Beitzel, W. D. (1988). *Mathematics applied to electronics* (3rd ed.). Englewood Cliffs, NJ: Prentice Hall.

Heywood, A. H. (1982). *Arithmetic: A programmed worktext* (4th ed.). Monterey, CA: Brooks/Cole.

Johnston, C. L., Willis, A. T., & Hughes, G. M. (1988). *Essential arithmetic* (5th ed.). Belmont, CA: Wadsworth.

Keedy, M. L., & Bittinger, M. L. (1986). *Introductory algebra* (5th ed.). Perdue, IN: Addison-Wesley.

Keedy, M. L., & Bittinger, M. L. (1987). *Essential mathematics* (5th ed.). Perdue, IN: Addison-Wesley.

Lewis, H. (1986). *Technical mathematics.* Albany, NY: Delmar.

Palmer, C. I., & Mrachek, L. A. (1985). *Practical mathematics* (7th ed.). Minneapolis: McGraw-Hill.

Proga, R. (1987). *Basic mathematics* (2nd ed.). Boston: Prindle, Weber & Schmidt.

Washington, A. J., & Triola, M. F. (1984). *Technical mathematics* (3rd ed.). Poughkeepsie, NY: Benjamin/Cummings.

GENERAL CORE

PSY 100 - Interpersonal Relations and Professional Development

Course Overview

Course Description

Provides a study of human relations and professional development in today's rapidly changing world that prepares students for living and working in a complex society. Topics include: personal skills required for understanding the self and others; projecting a professional image; job acquisition skills such as conducting a job search, interviewing techniques, job application, and resume preparation; desirable job performance skills; and desirable attitudes necessary for job retention and advancement.

Competency Areas

Human Relations Skills
Job Acquisition Skills
Job Retention Skills
Job Advancement Skills
Professional Image Skills

Prerequisite

Provisional admission

Credit Hours

3

Contact Hours Per Week

Class - 3

Lab - 0

GENERAL CORE

PSY 100 - Interpersonal Relations and Professional Development

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
HUMAN RELATIONS SKILLS		**6**	**0**
Goal setting	Develop and set personal goals.		
Stress management	Diagnose and respond to own stress level.		
Behavior problems	Identify strategies to handle difficult behaviors effectively.		
Personal introductions	Make proper introductions.		
Problem solving/decision making	Identify strategies to solve problems/make decisions.		
JOB ACQUISITION SKILLS		**15**	**0**
Job search	Identify strategies to conduct a job search.		
Career goals	Develop and set career goals.		
Employment documents	Prepare letter of application.		
	Prepare resume/applications.		
	Prepare follow-up letters.		
Interviewing	Demonstrate interviewing techniques.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
JOB RETENTION SKILLS		**3**	**0**
Office relationships	Identify techniques used to work effectively with co-workers.		
Time management	Develop time management strategies.		
JOB ADVANCEMENT SKILLS		**3**	**0**
Performance appraisal	Demonstrate ability to accept counseling positively.		
	Demonstrate ability to negotiate promotion/salary increase.		
Supervisory chain	Explain chain of responsibility.		
PROFESSIONAL IMAGE SKILLS		**3**	**0**
Image	Project professional image.		
Attitude	Project professional attitude.		

GENERAL CORE

PSY 100 - Interpersonal Relations and Professional Development

Resources

DuBrin, A. J. (1988). *Human relations--A job oriented approach* (4th ed.). Englewood Cliffs, NJ: Prentice Hall.

Milton, C. R. (1981). *Human behavior in organizations*. Englewood Cliffs, NJ: Prentice Hall.

Reynolds, C. (1988). *Dimensions in professional development* (3rd ed.). Cincinnati: South-Western.

Rogers, C. R. (1981). *Human behavior in organizations*. Cincinnati: South-Western.

Wilkes, M., & Crosswait, C. B. (1986). *Professional development--The dynamics of success* (3rd ed.). Atlanta: Harcourt Brace Jovanovich.

Williams, J. C., & Huber, G. P. (1986). *Human behavior in organizations*. Cincinnati: South-Western.

FUNDAMENTAL TECHNICAL

AHS 101 - Anatomy and Physiology

Course Overview

Course Description

Focuses on basic normal structure and function of the human body. Topics include: an overview of each body system, how systems coordinate activities to maintain a balanced state, recognizing deviations from the normal, and medical terminology including basic word structure and terms related to body structure and function are taught as an integral part of the course.

Competency Areas

Medical Terms Describing the Human Body
Structure and Function of the Human Body

Prerequisite

Provisional admission

Credit Hours

5

Contact Hours Per Week

Class - 5

Lab - 0

FUNDAMENTAL TECHNICAL

AHS 101 - Anatomy and Physiology

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
MEDICAL TERMS DESCRIBING THE HUMAN BODY		**10**	**0**
Patient information using a knowledge of anatomical terminology	Describe anatomical position.		
	Define and use the principle directional terms in human anatomy.		
	Identify on diagram, sagittal, transverse, and frontal sections of the body.		
	Define and locate the principle regions and cavities of the human body.		
Word elements and medical terminology	Give the definition of a selected group of prefixes, root combining forms, and suffixes.		
	Write the meaning of a selected list of medical terms.		
STRUCTURE AND FUNCTION OF THE HUMAN BODY		**40**	**0**
General plan and structure of the human body	Define anatomy and physiology.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Identify the structure of a cell, tissue, organ, and system, and explain the relationship among these structures as they constitute an organism.		
Chemical elements and the human body	Define the term homeostasis and metabolism.		
	Differentiate between inorganic and organic compounds and give examples of each.		
	Explain and distinguish among passive and active processes.		
	Contrast acids and use pH scale in describing acidity and alkalinity of a solution.		
	Identify the biologically significant elements from a given list by their chemical symbols and summarize the main functions of each in the body.		
Basic structure and function of systems for body integration and coordination: endocrine, nervous, and sensory systems	Locate the principle endocrine glands, and identify the principle hormone and functions.		
	Define the endocrine gland and hormone, and describe how the endocrine system works to maintain homeostasis.		
	Describe the negative feedback mechanism.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Describe the mechanism by which the hypothalamus links the nervous and endocrine systems.		
	Identify the general functions of the nervous system.		
	Explain the anatomical and functional classification of the nervous system.		
	Identify types of neurons and describe their functions.		
	Identify parts of a neuron.		
	Describe the physiology of a nerve impulse.		
	Describe structures that protect the brain and spinal cord.		
	Identify cranial nerves and give functions of each.		
	Compare and contrast the sympathetic with the parasympathetic nervous system.		
	Compare the effect of sympathetic with parasympathetic stimulation on a specific organ.		
	Identify spinal nerves and define plexus.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Name the principle areas and functions associated with the lobes of the cerebrum.		
	Identify parts of the brain.		
	Describe the structure and functions of the three major parts of the ear.		
	Describe the structure and functions of the eye.		
	Describe the physiology of vision.		
	Trace sound waves through the ear.		
	Differentiate special and general senses.		
	Describe tactile sensation and proprioception.		
Systems for maintenance of the body: cardiovascular, respiratory, gastrointestinal, and urinary systems	Describe the functions of the cardiovascular system.		
	Describe the major components of the cardiovascular system.		
	Describe the location of the heart in relation to other organs of the thoracic cavity and the associated serous membranes.		
	Label a heart identifying chambers, valves, and associated vessels of the heart.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Trace flow of blood through the heart, and distinguish between the pulmonary and systemic circulation.		
	Describe location of the parts of the conduction system of the heart, and trace the pathway of impulses initiation and conduction.		
	Describe the components of blood in reference to two main parts and the functions of each.		
	Explain the function of lymphatic systems as a subsystem to the circulatory system.		
	Describe parts of the upper and lower respiratory tract.		
	Trace the pathway of air into and out of the respiratory tract.		
	Explain the physiology of breathing.		
	Differentiate external and internal respirations.		
	Differentiate chemical and mechanical digestion.		
	Identify on diagram parts of the digestive system.		
	List primary and accessory digestive organs.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Briefly discuss physiology of all digestive organs.		
	Relate the role of the autonomic nervous system to functioning of the digestive system.		
	Associate location of the digestive organs with the front abdominal quadrants.		
	Differentiate visceral and parietal peritoneum.		
	Locate the parts of the urinary system on a diagram.		
	Explain general functions of the urinary system.		
	Explain the relationships of the urinary system to the endocrine and circulatory system.		
	Describe the structure and function of the nephron.		
	Compare the urinary system of the female with that of the male.		
	Identify the constituents of urine.		
	Differentiate among secretion, filtration, and reabsorption.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Body support and movement: musculoskeletal and integumentary systems	Identify functions of the integumentary system.		
	Describe parts of the integumentary system.		
	Explain two divisions of the skeletal system.		
	Identify bones of the two divisions.		
	Describe functions of the skeletal system.		
	Explain relationships of the endocrine system to the skeletal system.		
	Describe development of the skeletal system.		
	List functions of the skeletal muscles.		
	Identify three types of muscles.		
	Describe criteria used for naming muscles.		
	Name the muscles used for intramuscular injection sites.		
	Differentiate tenuous ligaments, fascia.		
	Explain functions of skeletal muscular system.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Explain physiology of a muscle contraction.		
	Describe kinds of movements possible as a result of skeletal muscle contraction and joint functioning.		
Systems for continuance of the species	Describe the anatomy and physiology of the female duct system.		
	Describe physiology of the ovary.		
	Identify three parts of the uterus.		
	Label diagram of the female reproductive system.		
	Explain the hormonal control of the menstrual cycle.		
	Describe the anatomy and physiology of the male duct system.		
	Describe physiology of the testes.		
	Relate the urinary system to the reproductive system of the males.		
	Explain the relationship of endocrine functioning to the male reproductive system.		

FUNDAMENTAL TECHNICAL

AHS 101 - Anatomy and Physiology

Resources

Anthony, C. P., & Thibodeau, G. A. (1983). *Structure and function of the body, time mirror.* St. Louis: Mosby.

Anthony, C. P., & Thibodeau, G. A. (1983). *Textbook of anatomy and physiology.* St. Louis: Mosby.

Marieb, E. (1988). *Essentials of human anatomy and physiology.* Menlo Park, CA: Addison Wesley.

Marieb, E. (1988). *Essentials of human anatomy and physiology workbook.* Menlo Park, CA: Addison Wesley.

Memmler, R. L., & Wood, D. L. (1986). *Structure and function of the human body.* Philadelphia: Lippincott.

Rice, J. (1986). *Medical terminology with human anatomy.* East Norwalk, CT: Appleton & Lange.

Rice, J. (1986). *Answer key and test bank: Medical terminology with human anatomy.* East Norwalk, CT: Appleton & Lange.

Soloman, E. P., & Phillips, G. A. (1987). *Understanding human anatomy and physiology.* Philadelphia: Lippincott.

Thomas, C. L. (1985). *Taber's cyclopedic medical dictionary.* Philadelphia: F. A. Davis.

FUNDAMENTAL TECHNICAL

AHS 109 - Medical Terminology for Allied Health Sciences

Course Overview

Course Description

Introduces the elements of medical terminology. Emphasis is placed on building familiarity with medical words through knowledge of roots, prefixes, and suffixes. Topics include: origins, word building, abbreviations and symbols, terminology related to the human anatomy, reading medical orders and reports, and terminology specific to the student's field of study.

Competency Areas

Word Origins (Roots, Prefixes, and Suffixes)
Word Building
Abbreviations and Symbols
Terminology Related to the Human Anatomy
Reading Medical Orders and Reports
Terminology Specific to the Student's Field of Study

Prerequisite

Provisional admission

Credit Hours

3

Contact Hours Per Week

Class - 3

Lab - 0

FUNDAMENTAL TECHNICAL

AHS 109 - Medical Terminology for Allied Health Sciences

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Lab
WORD ORIGINS (ROOTS, PREFIXES, AND SUFFIXES)		**5**	**0**
History of medical terminology	Explain derivation of medical terms.		
Fundamentals of terminology	Define word roots, prefixes, and suffixes.		
	Explain the conventions for combining morphemes and the formation of plurals.		
	Pronounce basic medical terms.		
Suffixes	Identify adjective endings.		
	Identify noun endings.		
Prefixes	Identify prefixes of position, color, number and measurement, negation, and direction.		
WORD BUILDING		**3**	**0**
Using morphemes	Form medical terms utilizing roots.		
	Form medical terms utilizing suffixes.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Form medical terms utilizing prefixes.		
Combining morphemes	Form medical terms combining roots, prefixes, and suffixes.		
ABBREVIATIONS AND SYMBOLS		**2**	**0**
Abbreviations	Interpret basic medical abbreviations.		
Symbols	Interpret basic medical symbols.		
TERMINOLOGY RELATED TO THE HUMAN ANATOMY		**7**	**0**
Integumentary system	Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system.		
Musculoskeletal system	Utilize diagnostic, surgical, and procedural terms and abbreviations related to the musculoskeletal system.		
Respiratory system	Utilize diagnostic, surgical, and procedural terms and abbreviations related to the respiratory system.		
Cardiovascular system	Utilize diagnostic, surgical, and procedural terms and abbreviations related to the cardiovascular system.		
Gastrointestinal system	Utilize diagnostic, surgical, and procedural terms and abbreviations related to the gastrointestinal system.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Urinary system	Utilize diagnostic, surgical, and procedural terms and abbreviations related to the urinary system.		
Male reproductive system	Utilize diagnostic, surgical, and procedural terms and abbreviations related to the male reproductive system.		
Female reproductive system	Utilize diagnostic, surgical, and procedural terms and abbreviations related to the female reproductive system.		
Nervous system	Utilize diagnostic, surgical, and procedural terms and abbreviations related to the nervous system.		
Endocrine system	Utilize diagnostic, surgical, and procedural terms and abbreviations related to the endocrine system.		
READING MEDICAL ORDERS AND REPORTS		**3**	**0**
Medical orders	Interpret medical orders.		
Medical reports	Interpret medical reports.		
	Prepare medical reports.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
TERMINOLOGY SPECIFIC TO THE STUDENT'S FIELD OF STUDY		**10**	**0**
Occupationally specific medical terminology	Utilize diagnostic, surgical, and procedural terms and abbreviations related to a specific medical field.		

FUNDAMENTAL TECHNICAL

AHS 109 - Medical Terminology for Allied Health Sciences

Resources

Chabner, D. (1985). *The language of medicine* (3rd ed.). Philadelphia: W. B. Saunders.

Glanze, W. D., Anderson, K. N., & Anderson L. E. (1986). *Mosby's medical and nursing dictionary* (2nd ed.). St. Louis: Mosby.

Gylys, B. A., & Wedding, M. E. (1988). *Medical terminology: A systems approach* (2nd ed.). Philadelphia: F. A. Davis.

Gylys, B. A., & Wedding, M. E. (1988). *Instructor's guide for medical terminology: A systems approach.* Philadelphia: F. A. Davis.

LaFleur, M. W., & Starr, W. K. (1988). *Exploring medical language.* St. Louis: Mosby.

Miller, B. F., & Keane, C. B. (1987). *Encyclopedia & dictionary of medicine, nursing, & allied health* (4th ed.). Philadelphia: W. B. Saunders.

Mosby. (1986). *Mosby's medical and nursing dictionary* (2nd ed.). St. Louis: Author.

Rice, E. P. (1985). *Phonetic dictionary of medical terminology: A spelling guide.* Owings Mills, MD: National Health.

Rice, J. (1986). *Medical terminology with human anatomy.* East Norwalk, CT: Appleton & Lange.

Rice, J. (1986). *Answer key and test bank: Medical terminology with human anatomy.* East Norwolk, CT: Appleton & Lange.

Smith, G. L., & Davis, P. E. (1988). *Medical terminology: A programmed text* (5th ed.). New York: John Wiley & Sons.

Squires, B. P. (1987). *Basic terms of anatomy and physiology* (2nd ed.). Philadelphia: W. B. Saunders.

Thomas, C. L. (Ed.). (1985). *Taber's cyclopedic medical dictionary.* Philadelphia: F. A. Davis.

FUNDAMENTAL TECHNICAL

RAD 101 - Introduction to Radiography

Course Overview

Course Description

Provides the student with an overview of radiography and patient care. Students will be oriented to the radiographic profession as a whole. Emphasis will be placed on patient care with consideration of both physical and psychological conditions. Topics include: ethics, medical and legal considerations, the "Right to Know Law," professionalism, basic principles of radiation protection, basic principles of exposure, equipment introduction, health care delivery systems, hospital and departmental organization, hospital and technical institution affiliation, body mechanics/transportation, vital signs, medical emergencies, contrast agents, CPR, medical and surgical asepsis, OR and mobile procedures, patient preparation, and death and dying.

Competency Areas

Ethics
Medical and Legal Considerations
"Right to Know Law"
Professionalism
Basic Principles of Radiation Protection
Basic Principles of Exposure
Equipment Introduction
Health Care Delivery Systems
Hospital and Departmental Organization
Hospital and Technical Institution Affiliation
Body Mechanics/Transportation
Vital Signs
Medical Emergencies
Contrast Agents
CPR
Medical and Surgical Asepsis
OR and Mobile Procedures
Patient Preparation
Death and Dying

Prerequisite

Program admission level reading and math competency

Credit Hours

5

Contact Hours Per Week

Class - 5

D.Lab - 1

FUNDAMENTAL TECHNICAL

RAD 101 - Introduction to Radiography

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
ETHICS		**1**	**0**
General ethics	Identify the general concepts of ethics.		
	Define terms and concepts pertaining to ethics.		
MEDICAL AND LEGAL CONSIDERATIONS		**2**	**0**
Medical ethics	Explain the basic principles of medical ethics.		
	Describe the Patient Bill of Rights.		
Legal ethics	Identify the principles of professional liability, negligence, and professional standards.		
	Explain the principles of professional liability, negligence, and professional standards.		
Patient consent	Identify the concepts relating to patient consent.		

Recommended Outline	After completing this section, the student will:	Hours Class	Lab
Hospital and departmental policies	Identify the purpose of hospital and departmental policies concerning patient records, patient information, documentation and reporting, and confidentiality.		
	Describe the importance of adherence to hospital and departmental policies concerning patient records, patient information, documentation and reporting, and confidentiality.		
Forensic radiography	Describe the basic ethical and legal considerations of forensic radiography.		
"RIGHT TO KNOW LAW"		**1**	**0**
Definitions	Define terms relating to informed consent.		
Practical considerations	Identify examination procedures utilizing informed consent.		
PROFESSIONALISM		**2**	**0**
Career mobility	Discuss the general employment outlook and economic return for the graduate radiographer.		
Career advancement	Discuss employment and career advancement opportunities for radiographers.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Continuing education	Identify the potential benefits of participation in continuing education in terms of improved patient care and career enhancement.		
Accreditation	Define the terms accreditation, certification, licensure, and registration.		
	Identify accrediting agencies.		
	Describe how the essential requirements and guidelines of accrediting agencies for radiography programs relate to the content of accredited educational programs.		
Credentialing	Explain the differences between the accreditation and credentialing processes.		
	Identify agencies involved in accreditation and credentialing for radiographic programs and radiographers.		
Professional organizations	Identify national, state, and district level professional organizations for radiographers.		
	Describe the purpose, functions, and activities of professional organizations for radiographers.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
BASIC PRINCIPLES OF RADIATION PROTECTION		**10**	**0**
Purposes	Explain the purposes of radiation protection as they relate to patients and personnel.		
Principles	Discuss the principles of radiation protection as they relate to patients and personnel.		
	Describe the student radiographer's responsibilities for radiation protection.		
Personnel monitoring	Identify personnel radiation monitoring devices.		
	Describe the advantages and disadvantages of each type of personnel radiation monitoring device.		
	Outline departmental rules and regulations concerning personnel radiation monitoring.		
	Interpret the contents of a periodic personnel exposure report.		
BASIC PRINCIPLES OF EXPOSURE		**2**	**0**
Patient responsibilities	Identify the basic responsibilities of student radiographers to the patient.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Controls and exposure	Identify concepts and terms relating to exposure and control factors such as density, contrast, exposure equations, directional terms, and critique points. Describe the relationship between control factors and exposure factors.		
Preparatory and examination procedures	Identify basic preparatory and examination procedures.		
EQUIPMENT INTRODUCTION		**2**	**2**
Equipment	Identify basic radiographic equipment.		
Processors	Identify basic components of processors.		
Accessories	Identify basic radiographic accessories such as screens, films, grids, and other accessories.		
HEALTH CARE DELIVERY SYSTEMS		**.5**	**0**
Radiologic history	Identify the early pioneers of radiology and their contributions. Describe what X-radiation is and how it is produced.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Health care modalities	Describe each of the radiological modalities such as radiation therapy, nuclear medicine, "CAT" scans, and magnetic resonance imaging. Explain the function of other (non-radiographic) health care components such as medical laboratories, physical and respiratory therapies, and medical records.		
HOSPITAL AND DEPARTMENTAL ORGANIZATION		**1**	**0**
Philosophy and mission	Discuss the philosophy and mission of the hospital.		
Administrative services	Identify key hospital administrative personnel. Discuss the relationship between key administrative personnel and the radiology department. Describe the relationship and interdependencies of departments within the hospital.		
Department of radiology organization and services	Identify key personnel in the radiology department. Discuss the function of key personnel in the radiology department. Explain patient services available in the radiology department.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Discuss the educational opportunities available in the radiology department.		
HOSPITAL AND TECHNICAL INSTITUTION AFFILIATION		**.5**	**0**
Hospital organization	Describe the chain of command for hospital administration and the radiology department.		
Sponsoring organization	Describe the chain of command for the sponsoring organization.		
BODY MECHANICS/ TRANSPORTATION		**1**	**1**
Principles of body mechanics	Describe the principles of body mechanics applicable to patient care.		
	Demonstrate the principles of body mechanics applicable to patient care.		
Patient transfer techniques	Demonstrate techniques for patient transfer such as wheelchair to table/table to wheelchair, stretcher to table/table to stretcher, wheelchair to bed/bed to wheelchair, stretcher to bed/bed to stretcher, three-man lift, and drawsheet lift.		
Turning the patient	Describe procedures for turning patients who have severe trauma, unconsciousness, disorientation, or amputated limbs.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Restraint techniques	Describe restraint techniques for various types of procedures and patient conditions. Demonstrate restraint techniques for various types of procedures and patient conditions.		
VITAL SIGNS		**1**	**2**
Measures of vitality	Describe vital signs used to assess patient condition. Explain the physiological principles related to temperature, pulse, respiration, and blood pressure. Identify normal values for the clinical measurement of temperature, pulse, respiration, and blood pressure.		
Equipment	Discuss the use and maintenance of equipment used to measure vital signs.		
Record-keeping	Record the results of vital sign measurements.		
MEDICAL EMERGENCIES		**10**	**0**
Symptomology	Identify symptoms which manifest the following conditions: cardiac arrest, anaphylactic shock, convulsion, seizure, hemorrhage, apnea, vomiting, aspiration, fractures, and diabetic coma/insulin reaction.		

Recommended Outline	After completing this section, the student will:	Hours Class	Lab
Acute care procedures	Discuss acute care procedures for cardiac arrest, anaphylactic shock, convulsion, seizure, hemorrhage, apnea, vomiting, aspiration, fractures, and diabetic coma/insulin reaction.		
Equipment and supplies	Discuss the use of medical emergency equipment and supplies. Given a simulated patient and conditions, demonstrate the use of oxygen equipment.		
CONTRAST AGENTS		**4**	**0**
Contrast agent types	Define the categories of contrast media. List specific examples of each contrast agent category.		
Pharmacological contra-indications and adverse reactions	Discuss the pharmacology of barium and iodine compounds with regards to patient history/allergy, patient precautions, patient reactions, chemical composition, and emergency care.		
Administration techniques	Describe administration methods and techniques for each type of contrast agent.		
CPR		**4**	**3**
Coding systems	Describe the emergency medical code system for health care institutions.		

Recommended Outline	After completing this section, the student will:	Hours Class	Lab
	Discuss the role of students in medical emergency situations.		
CPR techniques	Demonstrate competency in CPR.		
	Maintain CPR certification as needed.		
MEDICAL AND SURGICAL ASEPSIS		**5**	**2**
Terminology	Define terms and phrases such as asepsis, antiseptic, sterile, clean, sterile area, contaminated area, endogenous infection, ectogenous infection, infectious pathogen, communicable disease, and nosocomial infection.		
Antiseptics and sterilization	List common antiseptics.		
	Describe methods of sterilization.		
Infection sources and vectors	Describe sources of and modes for the transmission of infection.		
Infection control	Discuss each of the following procedures: scrubbing, donning gowns and gloves; sterile instrument handling; and sterile area maintenance.		
	Explain the principles of the care of wounds.		

Recommended Outline	After completing this section, the student will:	Hours Class	Lab
	Describe institutional and departmental procedures for infection control.		
Isolation	Discuss the use of isolation techniques.		
	Demonstrate the concepts of isolation technology such as room selection, use of gowns/masks/gloves, and frequency of hand washing.		
	Discuss the psychological considerations for the management of infectious patients.		
OR AND MOBILE PROCEDURES		**1**	**0**
Equipment	Demonstrate the manipulation of mobile radiographic equipment.		
PATIENT PREPARATION		**1**	**0**
Methods	Demonstrate methods of preparing patients for routine radiographic examinations.		
OR asepsis	Identify proper aseptic techniques where required for surgical and mobile radiographic procedures.		
DEATH AND DYING		**1**	**0**
Perceptual differences	Discuss the patient's and the professional's perception of the process of dying.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Impact of death	Discuss the ethical, emotional, and physical aspects of death.		
Stages	List the stages of dying.		
	Describe the characteristics of each stage of the death process.		
Support systems	Identify types and sources of support available to the terminally ill patient.		

FUNDAMENTAL TECHNICAL

RAD 101 - Introduction to Radiography

Resources

Ehrlich, R. A., & Givens, E. M. (1989). *Patient care in radiography* (3rd ed.). St. Louis: Mosby.

Gurley, L. T., et al. (1986). *Introduction to radiologic technology* (2nd ed.). St. Louis: Mosby.

Torres, L. S., & Morrill, C. (1983). *Basic medical techniques and patient care for radiologic technologists* (2nd ed.). Philadelphia: Lippincott.

FUNDAMENTAL TECHNICAL

RAD 104 - Radiographic Procedures I

Course Overview

Course Description

Introduces the knowledge required to perform radiographic procedures applicable to the human anatomy. Emphasis will be placed on the production of quality radiographs, and laboratory experience will demonstrate the application of theoretical principles and concepts. Topics include: an introduction to radiographic procedures; positioning terminology; positioning considerations; procedures, anatomy, and topographical anatomy related to body cavities, upper extremities, and the shoulder girdle.

Competency Areas

Introduction to Radiographic Procedures
Positioning Terminology
Positioning Considerations
Procedures, Anatomy, and Topographical Anatomy Related
to Body Cavities, Upper Extremities, and the Shoulder Girdle

Prerequisites/Corequisites

AHS 101, RAD 101

Credit Hours

3

Contact Hours Per Week

Class - 2

D.Lab - 3

FUNDAMENTAL TECHNICAL

RAD 104 - Radiographic Procedures I

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
INTRODUCTION TO RADIOGRAPHIC PROCEDURES		**1**	**1**
Patient identification confirmation	Determine the patient's identity using information on the request form. Confirm the patient's identity by checking the wrist band or questioning the patient.		
Procedure confirmation	Record information obtained from the patient on the requisition form using knowledge of medical terminology. Examine the radiographic requisition form to verify the accuracy and completeness of information on the form.		
POSITIONING TERMINOLOGY		**2**	**4**
Definitions	Define the following radiographic terms: view, position, and projection. Define the terms used to describe radiographic positioning.		
Positioning aids	Describe various positioning aids in terms of applications and their advantages/disadvantages.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Accessories	Describe various accessory equipment in terms of function and application.		
Calipers	Demonstrate the use of calipers.		
Lead markers	Discuss lead markers in terms of functions, types, and applications.		
POSITIONING CONSIDERATIONS		**1**	**1**
General considerations	Discuss general positioning considerations for radiographic procedures.		
Simulations	Given clinical simulations for various radiographic procedures, explain the general positioning considerations involved.		
PROCEDURES, ANATOMY, AND TOPOGRAPHICAL ANATOMY RELATED TO BODY CAVITIES, UPPER EXTREMITIES, AND THE SHOULDER GIRDLE		**16**	**24**
Thoracic cavity anatomy	Describe the anatomy of the thoracic cavity in terms of structure visualized and function demonstrated.		
Positioning	Describe routine and special views of the thoracic cavity in terms of structures visualized; functions demonstrated; and general positioning considerations.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Given clinical simulations for routine and special views of the thoracic cavity, explain the structures visualized; functions demonstrated; and the general positioning considerations involved. In a laboratory environment, perform radiographic procedures related to the thoracic cavity.		
Image evaluation	Evaluate radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		
Abdominopelvic cavity anatomy	Describe the anatomy of the abdominopelvic cavity in terms of structure visualized and function demonstrated.		
Positioning	Describe routine and special views of the abdominopelvic cavity in terms of structures visualized; functions demonstrated; and general positioning considerations. Given clinical simulations for routine and special views of the abdominopelvic cavity, explain the structures visualized; functions demonstrated; and the general positioning considerations involved. In a laboratory environment, perform radiographic procedures related to the abdominopelvic cavity.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Image evaluation	Evaluate radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		
Upper extremities anatomy	Describe the anatomy of the upper extremities in terms of structure visualized and function demonstrated.		
Positioning	Describe routine and special views of the upper extremities in terms of structures visualized; functions demonstrated; and general positioning considerations.		
	Given clinical simulations for routine and special views of the upper extremities, explain the structures visualized; functions demonstrated; and the general positioning considerations involved.		
	In a laboratory environment, perform radiographic procedures related to the upper extremities.		
Image evaluation	Evaluate radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		
Shoulder girdle anatomy	Describe the anatomy of the shoulder girdle in terms of structure visualized and function demonstrated.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Positioning	Describe routine and special views of the shoulder girdle in terms of structures visualized; functions demonstrated; and general positioning considerations. Given clinical simulations for routine and special views of the shoulder girdle, explain the structures visualized; functions demonstrated; and the general positioning considerations involved. In a laboratory environment, perform radiographic procedures related to the shoulder girdle.		
Image evaluation	Evaluate radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		

FUNDAMENTAL TECHNICAL

RAD 104 - Radiographic Procedures I

Resources

Ballinger, P. W. (1990). *Merrill's atlas of radiographic positions and radiographic procedures* (7th ed.). St. Louis: Mosby.

Bontrager, K. (1987). *Textbook of radiographic positioning and related anatomy* (2nd ed.). St. Louis: Mosby.

Kreel, L. (1980). *Clark's positioning in radiography* (Vol. I). (10th ed.). Chicago: Year Book Medical.

Kreel, L. (1981). *Clark's positioning in radiography* (Vol. II). (10th ed.). Chicago: Year Book Medical.

Meschan, I. (1978). *Radiographic positioning and related anatomy* (2nd ed.). Philadelphia: W. B. Saunders.

FUNDAMENTAL TECHNICAL

RAD 106 - Radiographic Procedures II

Course Overview

Course Description

Continues to develop the knowledge required to perform radiographic procedures. Topics include: anatomy and routine projections of the lower extremities, anatomy and routine projections of the pelvic girdle, anatomy and routine projections of the spine, and anatomy and routine projections of the bony thorax.

Competency Areas

Anatomy and Routine Projections of the Lower Extremities
Anatomy and Routine Projections of the Pelvic Girdle
Anatomy and Routine Projections of the Spine
Anatomy and Routine Projections of the Bony Thorax

Prerequisite

RAD 104

Credit Hours

3

Contact Hours Per Week

Class - 2

D.Lab - 3

FUNDAMENTAL TECHNICAL

RAD 106 - Radiographic Procedures II

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
ANATOMY AND ROUTINE PROJECTIONS OF THE LOWER EXTREMITIES		**6**	**8**
Lower extremities anatomy	Describe the anatomy of the lower extremities in terms of structures visualized and function demonstrated.		
Positioning	Describe routine and special views of the lower extremities in terms of structures visualized; functions demonstrated; and general positioning considerations.		
	Given clinical simulations for routine and special views of the lower extremities, explain the structures visualized; functions demonstrated; and the general positioning considerations involved.		
	In a laboratory environment, perform radiographic procedures related to the lower extremities.		
Image evaluation	Evaluate radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
ANATOMY AND ROUTINE PROJECTIONS OF THE PELVIC GIRDLE		**4**	**6**
Pelvic girdle anatomy	Describe the anatomy of the pelvic girdle in terms of structures visualized and function demonstrated.		
Positioning	Describe routine and special views of the pelvic girdle in terms of structures visualized; functions demonstrated; and general positioning considerations. Given clinical simulations for routine and special views of the pelvic girdle, explain the structures visualized; functions demonstrated; and the general positioning considerations involved. In a laboratory environment, perform radiographic procedures related to the pelvic girdle.		
Image evaluation	Evaluate radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		
ANATOMY AND ROUTINE PROJECTIONS OF THE SPINE		**6**	**10**
Spinal anatomy	Describe the anatomy of the spine in terms of structures visualized and function demonstrated.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Positioning	Describe routine and special views of the spine in terms of structures visualized; functions demonstrated; and general positioning considerations. Given clinical simulations for routine and special views of the spine, explain the structures visualized; functions demonstrated; and the general positioning considerations involved. In a laboratory environment, perform radiographic procedures related to the spine.		
Image evaluation	Evaluate radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		
ANATOMY AND ROUTINE PROJECTIONS OF THE BONY THORAX		**4**	**6**
Bony thorax anatomy	Describe the anatomy of the bony thorax in terms of structures visualized and function demonstrated.		
Positioning	Describe routine and special views of the bony thorax in terms of structures visualized; functions demonstrated; and general positioning considerations.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Given clinical simulations for routine and special views of the bony thorax, explain the structures visualized; functions demonstrated; and the general positioning considerations involved.		
	In a laboratory environment, perform radiographic procedures related to the bony thorax.		
Image evaluation	Evaluate radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		

FUNDAMENTAL TECHNICAL

RAD 106 - Radiographic Procedures II

Resources

Ballinger, P. W. (1990). *Merrill's atlas of radiographic positions and radiographic procedures* (7th ed.). St. Louis: Mosby.

Bontrager, K. (1987). *Textbook of radiographic positioning and related anatomy* (2nd ed.). St. Louis: Mosby.

Kreel, L. (1980). *Clark's positioning in radiography* (Vol. I). (10th ed.). Chicago: Year Book Medical.

Kreel, L. (1981). *Clark's positioning in radiography* (Vol. II). (10th ed.). Chicago: Year Book Medical.

Meschan, I. (1978). *Radiographic positioning and related anatomy* (2nd ed.). Philadelphia: W. B. Saunders.

FUNDAMENTAL TECHNICAL

RAD 107 - Principles of Radiographic Exposure I

Course Overview

Course Description

Introduces knowledge of the factors that govern and influence the production of the radiographic image on radiographic film. Laboratory experiences will demonstrate applications of theoretical principles and concepts. Emphasis will be placed on knowledge and techniques required to process radiographic film. Topics include: radiographic density, radiographic contrast, recorded detail, distortion, exposure latitude, film holders and intensifying screens, processing area considerations, chemicals, handling and storage of film, characteristics of films utilized in radiographic procedures, the automatic processor, artifacts, silver recovery, processing quality assurance concepts, and state and federal regulations.

Competency Areas

Radiographic Density
Radiographic Contrast
Recorded Detail
Distortion
Exposure Latitude
Film Holders and Intensifying Screens
Processing Area Considerations
Chemicals
Handling and Storage of Film
Characteristics of Films Utilized in Radiographic Procedures
Automatic Processor
Artifacts
Silver Recovery
Processing Quality Assurance Concepts
State and Federal Regulations

Prerequisite/Corequisite

RAD 101

Credit Hours

3

Contact Hours Per Week

Class - 3

P.Lab - 2

FUNDAMENTAL TECHNICAL

RAD 107 - Principles of Radiographic Exposure I

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
RADIOGRAPHIC DENSITY		**5**	**4**
Definition	Define radiographic density.		
Acceptable range	Identify the acceptable range of radiographic density.		
Factors	Describe how density affects image visibility.		
	Analyze the relationships of factors affecting radiographic density.		
	Utilize density formulas to solve radiographic density problems.		
	Analyze the production of unwanted density (fog).		
	Perform density experiments.		
RADIOGRAPHIC CONTRAST		**5**	**4**
Definition	Define radiographic contrast.		
	Explain the function of radiographic contrast.		
Components	Differentiate between subject and film contrast.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Factors	Describe the scale of contrast inclusive of its effect on radiographic contrast.		
	Analyze the relationships of factors affecting radiographic contrast.		
	Utilize formulas, graphs, and charts of factors affecting radiographic contrast to solve contrast problems.		
	Perform contrast experiments.		
RECORDED DETAIL		**5**	**4**
Definitions	Define recorded detail and visibility of detail.		
	Differentiate between sharpness (umbra) and unsharpness (penumbra).		
Components	Analyze the relationships of factors affecting recorded detail and visibility of detail.		
Factors	Utilize formulas and charts of factors affecting recorded detail to solve recorded detail problems.		
	Perform recorded detail experiments.		
DISTORTION		**2**	**2**
Definition	Define distortion.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Types	Differentiate between shape and size distortion.		
Factors	Analyze the relationships of factors affecting distortion.		
	Utilize distortion formulas to solve distortion problems.		
	Perform distortion experiments.		
EXPOSURE LATITUDE		**.5**	**1.5**
Definition	Define exposure latitude.		
Factors	Analyze the relationships of factors affecting exposure latitude.		
	Perform exposure latitude experiments.		
FILM HOLDERS AND INTENSIFYING SCREENS		**3**	**2**
Film holders and film	Discuss various film holders in terms of purpose, construction, application, patient dosage, loading/unloading, and maintenance.		
Intensifying screens	Explain the construction and purpose of intensifying screens.		
	Describe the operating principles and function of intensifying screens.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Explain the classifications of intensifying screens and the applications of each.		
	Discuss the maintenance of intensifying screens in terms of handling, cleaning, testing, and evaluation.		
PROCESSING AREA CONSIDERATIONS		**1**	**.5**
Location, construction, and function	Discuss the pertinent aspects of a processing area in terms of location, construction, and function.		
Lighting	Explain safe light illumination in terms of definition, filters, bulb size/color, and testing.		
	Describe daylight processing.		
Environment	Discuss the processing area environment in terms of ventilation, temperature control, and light proofing.		
Equipment	Given a list of the equipment/furnishings of a processing area, discuss the location, purpose, and operation of each.		
CHEMICALS		**1**	**0**
Developer solution	Describe the action of each component in the developer solution.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Fixer solution	Describe the action of each component in the fixer solution.		
HANDLING AND STORAGE OF FILM		1	0
Processing considerations	Analyze the effects of processing factors on film such as temperature, humidity, light, radiation, and handling.		
Storage considerations	Discuss the effects of temperature, humidity, light, radiation, gases/fumes, handling, pressure, and expiration date on the storage of radiographic film.		
CHARACTERISTICS OF FILMS UTILIZED IN RADIOGRAPHIC PROCEDURES		2	1
Composition	Given cross-sectional diagrams of radiographic film, label the components.		
	Describe the structure and function of each component of radiographic film.		
Types	Define properties of radiographic film and analyze the influence of each on the resultant image.		
Latent images	Define latent image formation.		
	Explain how sensitization specks contribute to latent image formation.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Characteristic curves	Define characteristic curve and explain its purpose. Given density values, graph characteristic curves for radiographic film. Interpret characteristic curves for radiographic film. Evaluate the utility of various films for specific procedures.		
AUTOMATIC PROCESSOR		**1**	**1**
Purpose and components	Discuss the purpose of automatic processors. Label the components of cross-sectional diagrams of automatic processors. Explain the function of each component of automatic processors. Describe the operating systems of the automatic processor and the functions of each. Given various types and sizes of film, demonstrate how each is fed into the processor.		
Processing cycle	Explain the components of the processing cycle, providing the specific action and duration of time for each component.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Maintenance	Discuss daily and periodic aspects of processor maintenance and cleaning.		
ARTIFACTS		**1**	**0**
Definition	Define artifact.		
Types	Describe types of radiographic artifacts in terms of cause and effect and methods of prevention.		
	Given radiographs containing artifacts, identify the type, cause, and methods of prevention for each.		
SILVER RECOVERY		**.5**	**0**
Definition	Define silver recovery.		
Rationale	Explain the rationale for silver recovery.		
Methods	Discuss methods of reclamation including process, advantages, and disadvantages of each method.		
Security	Discuss silver recovery security as it relates to control, theft, and misappropriation.		
PROCESSING QUALITY ASSURANCE CONCEPTS		**1**	**0**
Definition	Define processor sensitometry.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Rationale	Discuss the rationale for processor sensitometry.		
Procedures and equipment	Describe the steps used to perform accurate processor sensitometry.		
	Discuss daily and periodic aspects of processor maintenance and cleaning.		
Evaluation and interpretation	Evaluate film for processing quality.		
	Interpret flaws in radiographs and the corrective measures needed.		
STATE AND FEDERAL REGULATIONS		**1**	**0**
Hazards and regulations	Describe procedures for the handling of hazardous chemicals.		
	Explain OSHA regulations for handling hazardous chemicals.		
	Explain Georgia regulations for handling hazardous chemicals.		

FUNDAMENTAL TECHNICAL

RAD 107 - Principles of Radiographic Exposure I

Resources

Bushong, S. C. (1988). *Radiologic science for technologists* (4th ed.). St. Louis: Mosby.

Carroll, Q. B. (1985). *Fuch's principles of radiographic exposure, processing, and quality control* (3rd ed.). Springfield, IL: C. C. Thomas.

Curry, T. S., Dowdey, J. E., & Murry, R. C., Jr. (1990). *Christensen's physics of diagnostic radiology* (4th ed.). Philadelphia: Lea & Febiger.

DeAngelis, R. V., & Edgar, M. (N.D.). *Radiography workbook two.* Marlboro, NJ: Health & Allied Science.

Hiss, S. S. (1987). *Understanding radiography* (3rd ed.). Springfield, IL: C. C. Thomas.

Selman, J. (1985). *The fundamentals of x-ray and radium physics* (7th ed.). Springfield, IL: C. C. Thomas.

Sprawls, P. (1990). *Radiographic principles.* Rockville, MD: Aspen.

Thompson, T. T. (1979). *Cahoon's formulating x-ray techniques* (9th ed.). Durham, NC: Duke University Press.

FUNDAMENTAL TECHNICAL

RAD 111 - Radiologic Science I

Course Overview

Course Description

Introduces the concepts of basic physics and emphasizes the fundamentals of x-ray generating equipment. Topics include: units of measure, physical principles, atomic structure, the structure of matter, electrostatics, magnetism and electromagnetism, electrodynamics, and control of high voltage and rectification.

Competency Areas

Units of Measure
Physical Principles
Atomic Structure
Structure of Matter
Electrostatics
Magnetism and Electromagnetism
Electrodynamics
Control of High Voltage and Rectification

Prerequisite/Corequisite

MAT 103

Credit Hours

5

Contact Hours Per Week

Class - 5

Lab - 0

FUNDAMENTAL TECHNICAL

RAD 111 - Radiologic Science I

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
UNITS OF MEASURE		**3**	**0**
English and metric system	Define the fundamental units of measurement used in the English measurement system.		
	Define the fundamental units of measurement used in the metric measurement system.		
	Compare the utility of English and metric measurement systems.		
English/metric system conversion	Use conversion tables to convert metric measurements to their English equivalent.		
	Use conversion tables to convert English measurements to their metric equivalent.		
	Use conversion formulas and constants to convert metric measurements to English measurements and English measurements to metric measurements.		
PHYSICAL PRINCIPLES		**3**	**0**
Inertia and momentum	Define inertia and momentum.		

Recommended Outline	After completing this section, the student will:	Hours Class	Lab
	Describe the general principles relating to inertia and momentum.		
Energy and work	Define work.		
	Define kinetic and potential energy.		
	Describe the relationship between energy and work.		
	State the law of conservation of energy.		
ATOMIC STRUCTURE		**6**	**0**
Bohr's theory	Describe Bohr's theory of the hydrogen atom.		
Atomic structure	Describe the characteristics and functions of protons, neutrons, and electrons.		
	Describe the energy levels associated with a given atom.		
Ionization	Explain the process of ionization.		
Covalent and ionic bonding	Compare covalent and ionic bonding.		
STRUCTURE OF MATTER		**5**	**0**
Elements	Define element.		
	Describe the characteristics of a given element using the periodic table.		

Recommended Outline	After completing this section, the student will:	Hours Class	Lab
Molecules and compounds	Describe the characteristics of a molecule.		
	Define compound.		
ELECTROSTATICS		**3**	**0**
Terminology	Define electrical charge.		
	Define electrical field.		
Electrification	Describe the source of electrical charges and electrical fields.		
	Explain methods of electrification.		
Electrostatic laws	Explain the laws of electrostatics.		
	Describe applications of the laws of electrostatics.		
MAGNETISM AND ELECTROMAGNETISM		**12**	**0**
Magnetism	Discuss the properties of magnetism.		
	Discuss the laws of magnetism.		
	Explain the principle of magnetic induction.		
Electromagnetism	Explain the interaction between electrical and magnetic fields.		
	Discuss types of electromagnetic induction.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Describe types and functions of generators, motors, transformers, and coils.		
	Compare single- and three-phase generators in terms of radiation production and efficiency.		
ELECTRODYNAMICS		**9**	**0**
Terminology	Define the terms potential difference, current, and resistance.		
Characteristics of alternating and direct current	Describe the characteristics of alternating and direct current.		
Ohm's law	Solve direct current problems using Ohm's law.		
Resistance circuits	Given a schematic diagram of a resistance circuit, label the component parts.		
Electrical measurement and protective devices	Describe electrical measurement devices.		
	Given a schematic diagram, label the electrical measurement devices.		
	Describe electrical protective devices.		
CONTROL OF HIGH VOLTAGE AND RECTIFICATION		**9**	**0**
High voltage	Identify mechanisms used to control high voltage.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Compute transformed voltages and amperages using appropriate formulas.		
Rectification	Define rectification.		
	Explain the purpose of rectification.		
	Compare solid state and vacuum tube rectification in terms of function, advantages, and disadvantages.		

FUNDAMENTAL TECHNICAL

RAD 111 - Radiologic Science I

Resources

Bushong, S. C. (1988). *Radiologic science for technologists* (4th ed.). St. Louis: Mosby.

Curry, T. S., Dowdey, J. E., & Murry, R. C., Jr. (1990). *Christensen's physics of diagnostic radiology* (4th ed.). Philadelphia: Lea & Febiger.

DeAngelis, R. V., & Edgar, M. (N.D.). *Radiography workbook two*. Marlboro, NJ: Health & Allied Science.

Selman, J. (1985). *The fundamentals of x-ray and radium physics* (7th ed.). Springfield, IL: C. C. Thomas.

Sprawls, P. (1990). *Radiographic principles.* Rockville, MD: Aspen.

FUNDAMENTAL TECHNICAL

RAD 132 - Introductory Clinical Radiography I

Course Overview

Course Description

Introduces students to the hospital clinical setting and provides an opportunity for students to participate in or observe radiographic procedures. Emphasis is placed on clinical exposure to competencies in Radiographic Procedures I and II. Topics include: an orientation to hospital areas and procedures, mobile/surgery, and radiography and fluoroscopy; participation in and/or observation of procedures related to body cavities, the shoulder girdle, and upper extremities; and participation in and/or observation of routine projections of the lower extremities, pelvic girdle, spine, and bony thorax. Students' activities are under direct supervision.

Competency Areas

Orientation to Hospital Areas and Procedures
Orientation to Mobile/Surgery
Orientation to Radiography and Fluoroscopy
Participation in and/or Observation of Procedures Related to Body Cavities, the Shoulder Girdle, and Upper Extremities
Participation in and/or Observation of Routine Projections of the Lower Extremities, Pelvic Girdle, Spine, and Bony Thorax

Prerequisites

Program admission, RAD 104

Prerequisite/Corequisite

RAD 106

Credit Hours

4

Contact Hours Per Week

Class - 0

O.B.I. - 14

FUNDAMENTAL TECHNICAL

RAD 132 - Introductory Clinical Radiography I

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours OBI
ORIENTATION TO HOSPITAL AREAS AND PROCEDURES		**0**	**(140)**
Hospital areas	Locate departments, clinics, patient wards, operating rooms, administrative offices, and supply storage areas.		
	Identify the purpose of each department, office, and clinic in terms of its function as a part of a total health care delivery system.		
Departmental areas	Describe the layout of the radiology, radiation therapy, nuclear medicine, and diagnostic medical sonography departments.		
	Describe the services provided by the radiology, radiation therapy, nuclear medicine, and diagnostic medical sonography departments.		
	Describe the radiographic services offered outside departmental areas.		
	Identify the function of the radiology, radiation therapy, nuclear medicine, and diagnostic sonography departments in terms of membership in a total health care delivery system.		

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
Hospital procedures	Discuss the rationale for hospital program policies.		
	Describe the clinical evaluation center(s) rules and regulations.		
	Identify the major responsibilities and duties of a student radiographer.		
	Describe and/or perform administrative tasks required of a student radiographer.		
ORIENTATION TO MOBILE/ SURGERY		**0**	**(140)**
Equipment controls	Observe and/or participate in determining exposure factors and setting exposure controls on mobile/surgical radiographic equipment.		
Radiation protection	Observe and/or participate in the use of radiation protection procedures for mobile/surgical environments.		
Procedures	Observe and/or participate in conducting mobile/surgical radiographic procedures.		

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
ORIENTATION TO RADIOGRAPHY AND FLUOROSCOPY		**0**	**(140)**
Equipment controls	Observe and/or participate in determining exposure factors and setting exposure controls for fixed radiographic and fluoroscopic equipment.		
Radiation protection	Observe and/or participate in the use of radiation protection procedures for radiography and fluoroscopy.		
PARTICIPATION IN AND/OR OBSERVATION OF PROCEDURES RELATED TO BODY CAVITIES, THE SHOULDER GIRDLE, AND UPPER EXTREMITIES		**0**	**(140)**
Thoracic cavity	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the thoracic cavity.		
	Observe and/or participate in routine radiographic procedures involving the thoracic cavity.		
	Observe and/or participate in the evaluation of thoracic cavity radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
Abdominal cavity	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the abdominal cavity.	
	Observe and/or participate in routine radiographic procedures involving the abdominal cavity.	
	Observe and/or participate in the evaluation of abdominal cavity radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
Upper extremities	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the upper extremities.	
	Observe and/or participate in routine radiographic procedures involving the upper extremities.	
	Observe and/or participate in the evaluation of upper extremity radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
Shoulder girdle	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the shoulder girdle.	

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
	Observe and/or participate in routine radiographic procedures involving the shoulder girdle.		
	Observe and/or participate in the evaluation of shoulder girdle radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		
PARTICIPATION IN AND/OR OBSERVATION OF ROUTINE PROJECTIONS OF THE LOWER EXTREMITIES, PELVIC GIRDLE, SPINE, AND BONY THORAX		**0**	**(140)**
Lower extremities	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the lower extremities.		
	Observe and/or participate in routine radiographic procedures involving the lower extremities.		
	Observe and/or participate in the evaluation of lower extremity radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		
Pelvic girdle	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the pelvic girdle.		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in routine radiographic procedures involving the pelvic girdle.	
	Observe and/or participate in the evaluation of pelvic girdle radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
Spine	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the spine.	
	Observe and/or participate in routine radiographic procedures involving the spine.	
	Observe and/or participate in the evaluation of spinal radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
Bony thorax	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the bony thorax.	
	Observe and/or participate in routine radiographic procedures involving the bony thorax.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in the evaluation of bony thorax radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
Competency completion evaluation	Evaluate the number, types, and degree to which clinical competencies have been completed and mastered.	
Competency completion planning	Develop a plan in conjunction with on-site clinical supervisors and technical institute faculty to outline future completion and mastery of clinical competencies contained in this course.	
Continuing education/independent study	Identify an area of concern or interest related to the content of this clinical experience, and research, review a publication, or otherwise explore this topic to your satisfaction.	

FUNDAMENTAL TECHNICAL

RAD 132 - Introductory Clinical Radiography I

Resources

Ballinger, P. (1985). *Merrill's atlas of radiographic positions and radiographic procedures* (6th ed.). St. Louis: Mosby.

Bontrager, K. (1987). *Textbook of radiographic positioning and related anatomy* (2nd ed.). St. Louis: Mosby.

Ehrlich, R. A., & Givens, E. M. (1989). *Patient care in radiography* (3rd ed.). St. Louis: Mosby.

Kreel, L. (1980). *Clark's positioning in radiography* (Vol. I). (10th ed.). Chicago: Year Book Medical.

Kreel, L. (1981). *Clark's positioning in radiography* (Vol. II). (10th ed.). Chicago: Year Book Medical.

Meschan, I. (1978). *Radiographic positioning and related anatomy* (2nd ed.). Philadelphia: W. B. Saunders.

Torres, L. S., & Morrill, C. (1983). *Basic medical techniques and patient care for radiologic technologists* (2nd ed.). Philadelphia: Lippincott.

FUNDAMENTAL TECHNICAL

RAD 133 - Introductory Clinical Radiography II

Course Overview

Course Description

Continues introductory student learning experiences in the hospital setting. Emphasis is placed on those procedures discussed in Radiographic Procedures I, II, and III and practiced in previous clinical courses. Topics include: equipment utilization; exposure techniques; progress toward completion of clinical competencies through participation in and/or observation of routine projections of the lower extremities, pelvic girdle, spine, and bony thorax; and participation in and/or observation of procedures related to the gastrointestinal (GI), genitourinary (GU), and biliary systems. Execution of radiographic procedures will be conducted under direct and indirect supervision.

Competency Areas

Equipment Utilization
Exposure Techniques
Participation in and/or Observation of Routine Projections of the Lower Extremities, Pelvic Girdle, Spine, and Bony Thorax
Participation in and/or Observation of Procedures Related to the Gastrointestinal (GI), Genitourinary (GU), and Biliary Systems

Prerequisites

RAD 106, RAD 132

Prerequisite/Corequisite

RAD 109

Credit Hours

7

Contact Hours Per Week

Class - 0

O.B.I. - 21

FUNDAMENTAL TECHNICAL

RAD 133 - Introductory Clinical Radiography II

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
EQUIPMENT UTILIZATION		**0**	**(210)**
Equipment inspection	Observe safety checks of radiographic equipment and accessories. Recognize malfunctions in the radiographic unit (including table, tube and accessories). Note difficulties experienced which might assist in locating the cause of the malfunction. Report malfunctions in the radiographic unit (including table, tube, and accessories). Inspect and clean screens and cassettes regularly to identify and remove causes of artifacts. Recognize malfunctions in the automatic processor. Note difficulties experienced which might assist in locating the cause of the malfunction. Report malfunctions in the automatic processor. Monitor the performance of the automatic processor.		

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
	Clean, wash, disinfect, and/or sterilize the facilities and equipment (e.g., cassettes, tabletops) and dispose of contaminated items in preparation for the next examination.		
X-ray tube warm-up	Warm-up the x-ray tube to achieve proper operating conditions by following the manufacturer's prescribed sequence of steps.		
EXPOSURE TECHNIQUES		**0**	**(210)**
Film storage and processing	Store film/cassette in a manner which will reduce the possibility of accidentally exposing or reexposing the film.		
	Imprint proper identification information onto the film using either the radiographic, photographic, or light imprinter method.		
	Process exposed film by unloading the cassette and feeding it into the automatic processor.		
	Reload cassettes by selecting film of proper size and type.		
	Record required information on the request form following performance of examination (may include technologist identification, patient data, billing codes, number and size of films, technique, or other information as required by department protocol).		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Combine radiographic requisition and radiographs for interpretation and filing.	
Technique development	Determine appropriate exposure factors using calipers, technique charts, and tube rating charts for guidance.	
	Modify exposure factors for circumstances such as voluntary and involuntary motion, plaster casts, pathological conditions, and/or the patient's inability to cooperate.	
	Restrict beam to limit exposure to the area of interest and to improve image quality.	
	Set kVp, mA, and time or automated exposure system to achieve optimum image quality, safe operating conditions, and to minimize radiation exposure.	
Technique evaluation	Evaluate radiographs using a view box to make certain that radiographs contain proper identification and are of diagnostic quality.	
	Determine corrective measures if the radiograph is not of diagnostic quality.	

Recommended Outline	After completing this section, the student will:	Hours Class	Hours OBI
PARTICIPATION IN AND/OR OBSERVATION OF ROUTINE PROJECTIONS OF THE LOWER EXTREMITIES, PELVIC GIRDLE, SPINE, AND BONY THORAX		**0**	**(210)**
Lower extremities	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the lower extremities.		
	Observe and/or participate in routine radiographic procedures involving the lower extremities.		
	Observe and/or participate in the evaluation of lower extremity radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		
Pelvic girdle	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the pelvic girdle.		
	Observe and/or participate in routine radiographic procedures involving the pelvic girdle.		
	Observe and/or participate in the evaluation of pelvic girdle radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		
Spine	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the spine.		

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
	Observe and/or participate in routine radiographic procedures involving the spine.		
	Observe and/or participate in the evaluation of spinal radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		
Bony thorax	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the bony thorax.		
	Observe and/or participate in routine radiographic procedures involving the bony thorax.		
	Observe and/or participate in the evaluation of bony thorax radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		
PARTICIPATION IN AND/OR OBSERVATION OF PROCEDURES RELATED TO THE GASTROINTESTINAL (GI), GENITOURINARY (GU), AND BILIARY SYSTEMS		**0**	**(210)**
Gastrointestinal system	Observe and/or participate in patient preparation procedures for radiographic/fluoroscopic examinations of the gastrointestinal system.		
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the gastrointestinal system.		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the gastrointestinal system.	
	Evaluate the quality of radiographs and photospots of the gastrointestinal system in terms of positioning accuracy, image quality, and anatomical structures revealed.	
	Identify the special considerations for gastrointestinal procedures relating to the avoidance of repeated procedures.	
	Observe and/or participate in the identification of and care for acute reactions to contrast media.	
Genitourinary system	Observe and/or participate in patient preparation procedures for radiographic/fluoroscopic examinations of the genitourinary system.	
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the genitourinary system.	
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the genitourinary system.	
	Evaluate the quality of radiographs and photospots of the genitourinary system in terms of positioning accuracy, image quality, and anatomical structures revealed.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Identify the special considerations for genitourinary procedures relating to the avoidance of repeated procedures.	
	Observe and/or participate in the identification of and care for acute reactions to contrast media.	
Biliary system	Observe and/or participate in patient preparation procedures for radiographic/fluoroscopic examinations of the biliary system.	
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the biliary system.	
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the biliary system.	
	Evaluate the quality of radiographs and photospots of the biliary system in terms of positioning accuracy, image quality, and anatomical structures revealed.	
	Identify the special considerations for biliary system procedures relating to the avoidance of repeated procedures.	
	Observe and/or participate in the identification of and care for acute reactions to contrast media.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
Competency completion evaluation	Evaluate the number, types, and degree to which clinical competencies have been completed and mastered.	
Competency completion planning	Develop a plan in conjunction with on-site clinical supervisors and technical institute faculty to outline future completion and mastery of clinical competencies contained in this course.	
Continuing education/independent study	Identify an area of concern or interest related to the content of this clinical experience, and research, review a publication, or otherwise explore this topic to your satisfaction.	

FUNDAMENTAL TECHNICAL

RAD 133 - Introductory Clinical Radiography II

Resources

Ballinger, P. (1985). *Merrill's atlas of radiographic positions and radiographic procedures* (6th ed.). St. Louis: Mosby.

Bontrager, K. (1987). *Textbook of radiographic positioning and related anatomy* (2nd ed.). St. Louis: Mosby.

Ehrlich, R. A., & Givens, E. M. (1989). *Patient care in radiography* (3rd ed.). St. Louis: Mosby.

Kreel, L. (1980). *Clark's positioning in radiography* (Vol. I). (10th ed.). Chicago: Year Book Medical.

Kreel, L. (1981). *Clark's positioning in radiography* (Vol. II). (10th ed.). Chicago: Year Book Medical.

Meschan, I. (1978). *Radiographic positioning and related anatomy* (2nd ed.). Philadelphia: W. B. Saunders.

Torres, L. S., & Morrill, C. (1983). *Basic medical techniques and patient care for radiologic technologists* (2nd ed.). Philadelphia: Lippincott.

SPECIFIC TECHNICAL

RAD 109 - Radiographic Procedures III

Course Overview

Course Description

Continues development of the knowledge and skill required prior to execution of radiographic procedures in the clinical setting. Topics include: gastrointestinal (GI) procedures, genitourinary (GU) procedures, and biliary system procedures.

Competency Areas

Gastrointestinal (GI) Procedures
Genitourinary (GU) Procedures
Biliary System Procedures

Prerequisite

RAD 106

Credit Hours

3

Contact Hours Per Week

Class - 3

D.Lab - 1

SPECIFIC TECHNICAL

RAD 109 - Radiographic Procedures III

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
GASTROINTESTINAL (GI) PROCEDURES		**10**	**4**
Gastrointestinal (GI) anatomy	Describe the gastrointestinal (GI) anatomy in terms of structures visualized and function demonstrated.		
Positioning	Describe routine and special views of the gastrointestinal anatomy in terms of structures visualized; functions demonstrated; and general positioning considerations. Given clinical simulations for routine and special views of the gastrointestinal (GI) anatomy, explain the structures visualized; functions demonstrated; and the general and positioning considerations involved. In a laboratory environment, perform radiographic procedures related to the gastrointestinal (GI) anatomy.		
Image evaluation	Evaluate GI radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Contrast media	Describe the contrast media for each study in terms of type, administration methods, and quantity.		
Patient preparation	Describe patient preparation procedures for each contrast study.		
GENITOURINARY (GU) PROCEDURES		**10**	**4**
Genitourinary (GU) anatomy	Describe the genitourinary (GU) anatomy in terms of structures visualized and function demonstrated.		
Positioning	Describe routine and special views of the genitourinary (GU) anatomy in terms of structures visualized; functions demonstrated; and general positioning considerations. Given clinical simulations for routine and special views of the genitourinary (GU) anatomy, explain the structures visualized; functions demonstrated; and the general positioning considerations involved. In a laboratory environment, perform radiographic procedures related to the genitourinary (GU) anatomy.		
Image evaluation	Evaluate GU radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Contrast media	Describe the contrast media for each study in terms of type, administration methods, and quantity.		
Patient preparation	Describe patient preparation procedures for each contrast study.		
BILIARY SYSTEM PROCEDURES		**10**	**2**
Biliary system anatomy	Describe the anatomy of the biliary system in terms of structures visualized and functions demonstrated.		
Positioning	Describe routine and special views of the biliary system in terms of structures visualized; functions demonstrated; and general positioning considerations. Given clinical simulations for routine and special views of the biliary system, explain the structures visualized; functions demonstrated; and the general positioning considerations involved. In a laboratory environment, perform radiographic procedures related to the biliary system.		
Image evaluation	Evaluate biliary system radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Contrast media	Describe the contrast media for each study in terms of type, administration methods, and quantity.		
Patient preparation	Describe patient preparation procedures for each contrast study.		

SPECIFIC TECHNICAL

RAD 109 - Radiographic Procedures III

Resources

Ballinger, P. W. (1990). *Merrill's atlas of radiographic positions and radiographic procedures* (7th ed.). St. Louis: Mosby.

Bontrager, K. (1987). *Textbook of radiographic positioning and related anatomy* (2nd ed.). St. Louis: Mosby.

Kreel, L. (1980). *Clark's positioning in radiography* (Vol. I). (10th ed.). Chicago: Year Book Medical.

Kreel, L. (1981). *Clark's positioning in radiography* (Vol. II). (10th ed.). Chicago: Year Book Medical.

Meschan, I. (1978). *Radiographic positioning and related anatomy* (2nd ed.). Philadelphia: W. B. Saunders.

SPECIFIC TECHNICAL

RAD 113 - Radiographic Procedures IV

Course Overview

Course Description

Continues to develop the knowledge required to perform radiographic procedures. Topics include: anatomy and routine cranial radiography, and anatomy and routine facial radiography.

Competency Areas

Anatomy and Routine Cranial Radiography
Anatomy and Routine Facial Radiography

Prerequisite

RAD 104

Credit Hours

2

Contact Hours Per Week

Class - 2

D.Lab - 1

SPECIFIC TECHNICAL

RAD 113 - Radiographic Procedures IV

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
ANATOMY AND ROUTINE CRANIAL RADIOGRAPHY		**12**	**6**
Cranial anatomy	Describe the anatomy of the cranium in terms of structures visualized and functions demonstrated.		
Positioning	Describe routine and special views of the cranium in terms of structures visualized; functions demonstrated; and general positioning considerations. Given clinical simulations for routine and special views of the cranium, explain the structures visualized; functions demonstrated; and the general positioning considerations involved. In a laboratory environment, perform radiographic procedures related to the cranium.		
Image evaluation	Evaluate cranial radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
ANATOMY AND ROUTINE FACIAL RADIOGRAPHY		**8**	**4**
Facial anatomy	Describe the anatomy of the face in terms of structures visualized and functions demonstrated.		
Positioning	Describe routine and special views of the face in terms of structures visualized; functions demonstrated; and general positioning considerations. Given clinical simulations for routine and special views of the face, explain the structures visualized; functions demonstrated; and the general positioning considerations involved. In a laboratory environment, perform radiographic procedures related to the face.		
Image evaluation	Evaluate facial radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		

SPECIFIC TECHNICAL

RAD 113 - Radiographic Procedures IV

Resources

Ballinger, P. W. (1990). *Merrill's atlas of radiographic positions and radiographic procedures* (7th ed.). St. Louis: Mosby.

Bontrager, K. (1987). *Textbook of radiographic positioning and related anatomy* (2nd ed.). St. Louis: Mosby.

Kreel, L. (1980). *Clark's positioning in radiography* (Vol. I). (10th ed.). Chicago: Year Book Medical.

Kreel, L. (1981). *Clark's positioning in radiography* (Vol. II). (10th ed.). Chicago: Year Book Medical.

Meschan, I. (1978). *Radiographic positioning and related anatomy* (2nd ed.). Philadelphia: W. B. Saunders.

SPECIFIC TECHNICAL

RAD 114 - Radiologic Science II

Course Overview

Course Description

Continues discussion of the concepts of basic physics and the fundamentals of x-ray generating equipment. Topics include: x-ray tubes, x-ray circuits, and the production and characteristics of radiation.

Competency Areas

X-Ray Tubes
X-Ray Circuits
Production and Characteristics of Radiation

Prerequisite

RAD 111

Credit Hours

2

Contact Hours Per Week

Class - 2

Lab - 0

SPECIFIC TECHNICAL

RAD 114 - Radiologic Science II

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
X-RAY TUBES		**6**	**0**
Anodes and cathodes	Describe the characteristics of a rotating anode in terms of construction and function. Describe the characteristics of a cathode in terms of construction and function.		
Tube housing	Describe the construction and function of an X-ray tube housing.		
Cables	Describe the construction and function of X-ray tube cables.		
X-ray tube construction	Given an X-ray tube rating chart, determine the maximum time allowable exposure factor for various radiographic procedures. Given simulated exposure factors, use an anode cooling chart to determine the rate of anode cooling. Given simulated exposures and a housing cooling chart, determine the heat units accumulated (latent heat) and the cooling characteristics of the X-ray tube housing.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
X-RAY CIRCUITS		**6**	**0**
Primary circuit	Describe the components of an X-ray primary circuit and explain the function of each component.		
Secondary circuit	Describe the components of an X-ray secondary circuit in terms of the arrangement and function of each component.		
Filament circuit	Describe the components of an X-ray filament circuit in terms of the arrangement and function of each component.		
Compound circuit identification	Given a simple diagram of a complete X-ray circuit with missing components, complete the circuit and label the components.		
PRODUCTION AND CHARACTERISTICS OF RADIATION		**8**	**0**
Principles	State the principles of X-ray production. Compare the production of *Bremstrahlung* (braking rays) with the production of characteristic X-rays. Describe the conditions necessary to produce X-rays.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Photon interaction and disintegration	Discuss various photon interactions in terms of interaction description, relation to atomic number, and applications.		
	Define photon disintegration.		
Beam penetration, absorption, and scatter	Discuss the relationships of wavelength and frequency in terms of beam penetration, absorption, and scatter.		
Units of measure	Define the units of measure used to quantify radiation.		
	List examples of the radiological applications of radiation units of measure.		

SPECIFIC TECHNICAL

RAD 114 - Radiologic Science II

Resources

Bushong, S. C. (1988). *Radiologic science for technologists* (4th ed.). St. Louis: Mosby.

Curry, T. S., Dowdey, J. E., & Murry, R. C., Jr. (1990). *Christensen's physics of diagnostic radiology* (4th ed.). Philadelphia: Lea & Febiger.

DeAngelis, R. V., & Edgar, M. (N.D.). *Radiography workbook two.* Marlboro, NJ: Health & Allied Science.

Selman, J. (1985). *The fundamentals of x-ray and radium physics* (7th ed.). Springfield, IL: C. C. Thomas.

Sprawls, P. (1990). *Radiographic principles.* Rockville, MD: Aspen.

SPECIFIC TECHNICAL

RAD 116 - Principles of Radiographic Exposure II

Course Overview

Course Description

Continues to develop knowledge of the factors that govern and influence the production of the radiographic image on radiographic film. Topics include: beam limiting devices, beam filtration, scattered/secondary radiation, control of the remnant beam, technique formation, and exposure calculations.

Competency Areas

Beam Limiting Devices
Beam Filtration
Scattered/Secondary Radiation
Control of the Remnant Beam
Technique Formation
Exposure Calculations

Prerequisite

RAD 107

Credit Hours

2

Contact Hours Per Week

Class - 2

D.Lab - 1

SPECIFIC TECHNICAL

RAD 116 - Principles of Radiographic Exposure II

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
BEAM LIMITING DEVICES		**2**	**1**
Definition	Define beam limiting device.		
Purpose	Explain the purposes of beam limiting devices in terms of patient dosage, scattered radiation production, radiographic density, and contrast.		
Types	Describe types of beam limiting devices in terms of function and applications.		
BEAM FILTRATION		**3**	**2**
Definition	Define filtration.		
Rationale	Describe the rationale for filtration of the primary beam.		
Composition	Describe the metals used for beam filtration.		
Types	Explain types of filtration in terms of radiation output, patient dosage, radiation density, and contrast.		
Half value layer	Define the half value layer.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Describe applications of the half value layer in terms of radiation output and patient dosage.		
SCATTERED/SECONDARY RADIATION		**4**	**2**
Definition	Define scattered/secondary radiation.		
Interactions	Describe interactions of x-rays with matter which produce scattered/secondary radiation.		
Factors	Analyze relationships of factors affecting scattered/secondary radiation.		
Effects	Discuss effects of scattered/secondary radiation in terms of patient dosage, image quality, and occupational exposure.		
CONTROL OF THE REMNANT BEAM		**4**	**2**
kVp selection	Explain the relationship between kVp and scattered/secondary radiation.		
Grids	Describe a grid in terms of its purpose, components, and construction.		
	Differentiate among types of grids.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Analyze grid efficiency in terms of grid ratio and frequency.		
	Given technical information, select an appropriate grid.		
	Define grid cut off.		
	Describe various grid artifacts.		
Beam limitations	Explain the relationship between beam limitation and scattered/secondary radiation.		
TECHNIQUE FORMATION		**3**	**1**
Purpose	Explain the purpose of technique formation in terms of standardization of exposure and image consistency.		
Considerations	Discuss the considerations involved in technique selection.		
Types	Distinguish among the various types of technique systems.		
Application	Given clinical simulations, demonstrate patient measurement and technique selection.		
EXPOSURE CALCULATIONS		**4**	**2**
Factors	Calculate and analyze the relationships between factors affecting exposure.		

SPECIFIC TECHNICAL

RAD 116 - Principles of Radiographic Exposure II

Resources

Bushong, S. C. (1988). *Radiologic science for technologists* (4th ed.). St. Louis: Mosby.

Carroll, Q. B. (1985). *Fuch's principles of radiographic exposure, processing, and quality control* (3rd ed.). Springfield, IL: C. C. Thomas.

Curry, T. S., Dowdey, J. E., & Murry, R. C., Jr. (1990). *Christensen's physics of diagnostic radiology* (4th ed.). Philadelphia: Lea & Febiger.

DeAngelis, R. V., & Edgar, M. (N.D.). *Radiography workbook two*. Marlboro, NJ: Health & Allied Science.

Hiss, S. S. (1987). *Understanding radiography* (3rd ed.). Springfield, IL: C. C. Thomas.

Selman, J. (1985). *The fundamentals of x-ray and radium physics* (7th ed.). Springfield, IL: C. C. Thomas.

Sprawls, P. (1990). *Radiographic principles.* Rockville, MD: Aspen.

Thompson, T. T. (1979). *Cahoon's formulating x-ray techniques* (9th ed.). Durham, NC: Duke University Press.

SPECIFIC TECHNICAL

RAD 117 - Radiographic Imaging Equipment

Course Overview

Course Description

Provides knowledge of equipment routinely utilized to produce diagnostic images. Various recording media and techniques are discussed. Topics include: radiographic equipment, image intensified fluoroscopy, recording media and techniques, image noise, other imaging equipment such as CT and MRI, computer literacy, monitoring and maintenance, and state and federal regulations.

Competency Areas

Radiographic Equipment
Image Intensified Fluoroscopy
Recording Media and Techniques
Image Noise
Other Imaging Equipment
Computer Literacy
Monitoring and Maintenance
State and Federal Regulations

Prerequisite

RAD 116

Credit Hours

4

Contact Hours Per Week

Class - 3

D.Lab - 3

SPECIFIC TECHNICAL

RAD 117 - Radiographic Imaging Equipment

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
RADIOGRAPHIC EQUIPMENT		**4**	**4**
Permanent installation	Discuss permanent installation radiographic equipment in terms of purpose, components, types, and applications. Demonstrate the operation of various types of permanent installation radiographic equipment.		
Mobile units	Discuss mobile units in terms of purpose, components, types, and applications. Demonstrate the operation of various types of mobile unit radiographic equipment.		
IMAGE INTENSIFIED FLUOROSCOPY		**6**	**1**
Definition	Define image intensified fluoroscopy.		
Components	Diagram the components of an image intensifier.		
Function	Explain the function of an image intensifier.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Intensification	Discuss gain and conversion factor as related to intensification.		
Optical system	Describe the optical system of an image intensifier.		
Image formation	Discuss image formation in terms of image size, framing, and brightness.		
Applications	Discuss applications of image intensified fluoroscopy.		
Operation/technique	Discuss operational techniques for using image intensified fluoroscopy equipment.		
RECORDING MEDIA AND TECHNIQUES		**6**	**3**
Video tubes	Discuss video tubes in terms of purpose, construction, and applications.		
Video recorders	Discuss video recorders in terms of purpose, construction, types, and applications.		
Cineradiography equipment	Discuss cineradiography equipment in terms of purpose, construction, and applications.		
Strip film cameras	Discuss strip film cameras in terms of purpose, construction, and applications.		
Image enlargement	Discuss image enlargement in terms of purpose and procedure.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Stereoscopic radiography	Discuss stereographic radiography in terms of purpose and procedure.		
Conventional tomography	Discuss conventional tomography in terms of purpose, principles, motions, equipment, and procedure.		
IMAGE NOISE		**2**	**2**
Definition/description	Define image noise and describe its appearance.		
Types	Discuss types of image noise in terms of source, relation to exposure, relation to definition, relation to contrast, and methods of control.		
OTHER IMAGING EQUIPMENT		**3**	**3**
Modalities	Discuss other imaging modalities in terms of purpose, principles, equipment/material, and procedure.		
COMPUTER LITERACY		**5**	**15**
Foundations	Define terms and concepts relating to computer fundamentals such as computer, input/output, storage media, and ROM/RAM.		
Components	Define common computer components in terms of purpose and function.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Differentiate between various devices such as keyboards, monitors, printers, disk drives, and other storage media in terms of input/output.		
Radiological computer applications	Describe various imaging applications of computers in radiology such as digital imaging, C.T., etc.		
	Describe various management applications of computers in radiology such as patient recordkeeping, staffing, Q.I., etc.		
MONITORING AND MAINTENANCE		**2**	**2**
Proper operating conditions	Warm-up the x-ray tube to achieve proper operating conditions by following the manufacturer's prescribed sequence of steps.		
	Perform safety checks of radiographic equipment and accessories (e.g., lead aprons and gloves, collimator accuracy).		
	Recognize malfunctions in the radiographic unit (including table, tube, and accessories).		
	Note any difficulties experienced which might assist in locating the cause of the malfunction.		

Recommended Outline	After completing this section, the student will:	Hours Class	Lab
	Report malfunctions in the radiographic unit (including table, tube, and accessories).		
STATE AND FEDERAL REGULATIONS		**2**	**0**
State	Identify state agencies involved with regulations, inspections, and enforcement as they relate to safe equipment operation.		
	Discuss the role of state agencies involved with regulations, inspections, and enforcement as they relate to safe equipment operation.		
Federal	Identify federal agencies involved with regulation and enforcement/ consultation services as they relate to safe equipment operation.		
	Discuss the role of federal agencies involved with regulation and enforcement/consultation services as they relate to safe equipment operation.		

SPECIFIC TECHNICAL

RAD 117 - Radiographic Imaging Equipment

Resources

Bushong, S. C. (1988). *Radiologic science for technologists* (4th ed.). St. Louis: Mosby.

Curry, T. S., Dowdey, J. E., & Murry, R. C., Jr. (1990). *Christensen's physics of diagnostic radiology* (4th ed.). Philadelphia: Lea & Febiger.

DeAngelis, R. V., & Edgar, M. (N.D.). *Radiography workbook two*. Marlboro, NJ: Health & Allied Science.

Seeram, E. (1989). *Imaging equipment*. Springfield, IL: C. C. Thomas.

Selman, J. (1985). *The fundamentals of x-ray and radium physics* (7th ed.). Springfield, IL: C. C. Thomas.

Sprawls, P. (1990). *Radiographic principles.* Rockville, MD: Aspen.

SPECIFIC TECHNICAL

RAD 118 - Special Radiographic Procedures

Course Overview

Course Description

Provides instruction in the more complicated special radiologic procedures of the body. Topics include: minor procedures, sterile techniques, special equipment, and introduction to angiographic and interventional procedures.

Competency Areas

Minor Procedures
Sterile Techniques
Special Equipment
Introduction to Angiographic and
Interventional Procedures

Prerequisite

RAD 113

Credit Hours

3

Contact Hours Per Week

Class - 3

D.Lab - 1

SPECIFIC TECHNICAL

RAD 118 - Special Radiographic Procedures

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
MINOR PROCEDURES		**6**	**4**
Terminology	Define terms and phrases related to special procedures such as arthrogram, bronchogram, endoscopic retrograde cholangiopancreatogram (ERCP), myelogram, sialogram, venogram, and mammogram/ xerogram.		
Indications and contraindications	Identify the indications and contra-indications for the following procedures: arthrogram, bronchogram, endoscopic retrograde cholangiopancreatogram (ERCP), myelogram, sialogram, venogram, and mammogram/xerogram.		
Imaging, equipment, and supplies	Discuss imaging, equipment, and supplies used for the following procedures: arthrogram, bronchogram, endoscopic retrograde cholangiopancreatogram (ERCP), myelogram, sialogram, venogram, and mammogram/xerogram.		
Contrast media	Given various minor radiographic procedures, describe the contrast medium utilized in terms of type, administration method, and quantity.		

Recommended Outline	After completing this section, the student will:	Hours Class	Lab
Pre/post-procedural techniques	Describe the preparation and post-procedural care for each minor radiographic procedure, inclusive of adverse reactions.		
Interpretation	Given radiographs, identify the type of procedure performed, anatomy visualized, and any indicated pathology.		
Radiographer's responsibility	Describe the radiographer's role during each minor procedure.		
STERILE TECHNIQUES		**4**	**2**
Basic principles of sterile techniques	State the basic principles of sterile techniques.		
	Define the four main methods for transmitting infectious agents.		
	Describe the five methods of sterilization.		
	Explain the processes of pre-procedural and post-procedural care in sequential steps.		
	Describe the approaches used for arterial/venous catheterization.		
Gowning and gloving	Demonstrate methods of "open" and "closed" gowning and gloving.		
	Identify the parameters of sterile gowns.		

Recommended Outline	After completing this section, the student will:	Hours Class	Lab
Application methods and procedures	Describe the method used to open a sterile package. Describe the method used by an unsterile person to open a sterile package for a sterile person. Explain the procedure for "scrubbing in" a patient. Demonstrate the proper procedures for performing sterile techniques including: creating a sterile field; gowning and gloving oneself; scrubbing a patient in; and assisting the radiologist or physician.		
SPECIAL EQUIPMENT		**8**	**0**
Fluoroscopy/recording media	List essential and optional fluoroscopic/radiographic equipment. Discuss the advantages and disadvantages associated with the use of image intensifiers. Discuss the tube, generator, and transformer requirements for bi-plane and magnification radiography. Describe subtraction and duplication in terms of purpose, equipment, film, and procedures.		
Rapid film changers	Discuss rapid film changers in terms of purpose, types, construction, and applications.		

Recommended Outline	After completing this section, the student will:	Hours Class	Lab
	Differentiate between biplane and single plane filming.		
Injectors and program selectors	Discuss the function of automatic and mechanical contrast medium injectors.		
	Discuss the function of the program selector.		
	Identify the variables controlled by program selectors.		
Miscellaneous supplies and equipment	Describe the functions and purposes of catheters and guidewires.		
	List problems that may arise in the use of catheters and guidewires.		
	Identify the uses of optional minor radiographic supplies such as cannulas, hubs, baseplates, stylets, stopcocks, and dialators.		
INTRODUCTION TO ANGIOGRAPHIC AND INTERVENTIONAL PROCEDURES		**12**	**4**
Circulatory system	Identify the major routes of arterial and venous blood circulation on diagrams and/or radiographs.		
	Define the purpose and function of cerebral, visceral, peripheral, and digital subtraction angiography.		
	Describe and/or demonstrate projections used for each procedure.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Given radiographs, identify the routes of contrast media for each procedure, including pertinent anatomy passed on route.		
	Describe the most preferred approach to catheterization.		
	Describe the Seldinger Technique.		
Interventional procedures	Define interventional techniques.		
	Define terms relating to interventional techniques.		
	Describe the processes involved in the performance of interventional techniques.		
	Describe indications and contraindications for interventional procedures.		

SPECIFIC TECHNICAL

RAD 118 - Special Radiographic Procedures

Resources

Ballinger, P. W. (1990). *Merrill's atlas of radiographic positions and radiographic procedures* (7th ed.). St. Louis: Mosby.

Bontrager, K. (1987). *Textbook of radiographic positioning and related anatomy* (2nd ed.). St. Louis: Mosby.

Kreel, L. (1980). *Clark's positioning in radiography* (Vol. I). (10th ed.). Chicago: Year Book Medical.

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Tortorici, M. R. (1982). *Fundamentals of angiography*. St. Louis: Mosby.

SPECIFIC TECHNICAL

RAD 119 - Radiographic Pathology

Course Overview

Course Description

Provides the student with an introduction to the concepts of disease. Pathology and disease are discussed as they relate to various radiographic procedures. Topics include: pathology fundamentals, trauma/physical injury, and systemic classifications of disease.

Competency Areas

Pathology Fundamentals
Trauma/Physical Injury
Systemic Classifications of Disease

Prerequisite

AHS 101

Credit Hours

2

Contact Hours Per Week

Class - 2

D.Lab - 1

SPECIFIC TECHNICAL

RAD 119 - Radiographic Pathology

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
PATHOLOGY FUNDAMENTALS		**3**	**0**
Terminology	Define terms relevant to pathology.		
	Discuss pathological conditions in terms of their relevance to radiographic procedures.		
TRAUMA/PHYSICAL INJURY		**4**	**1**
Classifications	List the classifications of trauma.		
	Define the classifications of trauma.		
Characteristics	Describe the sites, complications, and prognoses for classifications of trauma.		
Radiographic diagnosis	Discuss radiographic diagnostic procedures for classifications of trauma.		
SYSTEMIC CLASSIFICATIONS OF DISEASE		**13**	**9**
Categories	List the major systemic classifications of disease.		
	Describe each systemic classification of disease.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Skeletal/articular diseases	List examples and sites of skeletal/articular diseases.		
	Describe the etiology of skeletal/articular diseases.		
	Discuss the complications and prognoses associated with skeletal/articular diseases.		
	Describe the radiographic procedures for diagnosis/treatment of skeletal/articular diseases.		
	Discuss the effects of skeletal/articular diseases in terms of effects on radiographic techniques.		
Muscular diseases	List examples and sites of muscular diseases.		
	Describe the etiology of muscular diseases.		
	Discuss the complications and prognoses associated with muscular diseases.		
	Describe the radiographic procedures for diagnosis/treatment of muscular diseases.		
	Discuss the effects of muscular diseases in terms of effects on radiographic techniques.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Digestive system diseases	List examples and sites of digestive system diseases.		
	Describe the etiology of digestive system diseases.		
	Discuss the complications and prognoses associated with digestive system diseases.		
	Describe the radiographic procedures for diagnosis/treatment of digestive system diseases.		
	Discuss the effects of digestive system diseases in terms of effects on radiographic techniques.		
Respiratory system diseases	List examples and sites of respiratory system diseases.		
	Describe the etiology of respiratory system diseases.		
	Discuss the complications and prognoses associated with respiratory system diseases.		
	Describe the radiographic procedures for diagnosis/treatment of respiratory system diseases.		
	Discuss the effects of respiratory system diseases in terms of effects on radiographic techniques.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Urinary system diseases	List examples and sites of urinary system diseases.		
	Describe the etiology of urinary system diseases.		
	Discuss the complications and prognoses associated with urinary system diseases.		
	Describe the radiographic procedures for diagnosis/treatment of urinary system diseases.		
	Discuss the effects of urinary system diseases in terms of effects on radiographic techniques.		
Reproductive system diseases	List examples and sites of reproductive system diseases.		
	Describe the etiology of reproductive system diseases.		
	Discuss the complications and prognoses associated with reproductive system diseases.		
	Describe the radiographic procedures for diagnosis/treatment of reproductive system diseases.		
	Discuss the effects of reproductive system diseases in terms of effects on radiographic techniques.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Circulatory system diseases	List examples and sites of circulatory system diseases.		
	Describe the etiology of circulatory system diseases.		
	Discuss the complications and prognoses associated with circulatory system diseases.		
	Describe the radiographic procedures for diagnosis/treatment of circulatory system diseases.		
	Discuss the effects of circulatory system diseases in terms of effects on radiographic techniques.		
Endocrine system diseases	List examples and sites of endocrine system diseases.		
	Describe the etiology of endocrine system diseases.		
	Discuss the complications and prognoses associated with endocrine system diseases.		
	Describe the radiographic procedures for diagnosis/treatment of endocrine system diseases.		
	Discuss the effects of endocrine system diseases in terms of effects on radiographic techniques.		

Recommended Outline	After completing this section, the student wil'	Hours Class	Hours Lab
Nervous system and sensory organ system diseases	List examples and sites of nervous system and sensory organ system diseases. Describe the etiology of nervous system and sensory organ system diseases. Discuss the complications and prognoses associated with nervous system and sensory organ system diseases. Describe the radiographic procedures for diagnosis/treatment of nervous system and sensory organ system diseases. Discuss the effects of nervous system and sensory organ system diseases in terms of effects on radiographic techniques.		

SPECIFIC TECHNICAL

RAD 119 - Radiographic Pathology

Resources

Armstrong, P., & Wastie, M. L. (1981). *X-ray diagnosis.* Boston: Blackwell Scientific.

Brinbok, G. (1965). *Pathology for radiographers.* London: Butterworths.

Eisenberg, D. (1985). *Pathology for radiographers.* St. Louis: Mosby.

Hamilton, H., & McVan, B. (1987). *Professional guide to diseases* (2nd ed.). Springhouse, PA: Intermed Communications.

Laudicina, P. (1989). *Applied pathology for radiographers.* Philadelphia: W. B. Saunders.

Mace, J. D., & Kowalczyk, N. M. (1988). *Radiographic pathology for technologists.* St. Louis: Mosby.

SPECIFIC TECHNICAL

RAD 120 - Principles of Radiation Biology and Protection

Course Overview

Course Description

Provides instruction on the principles of cell radiation interaction. Radiation effects on cells and factors affecting cell response are presented. Acute and chronic effects of radiation are discussed. Topics include: radiation detection and measurement, patient protection, personnel protection, maximum permissible dose (MPD), agencies and regulations, introduction to radiation biology, cell anatomy, radiation/cell interaction, and effects of radiation.

Competency Areas

Radiation Detection and Measurement
Patient Protection
Personnel Protection
Maximum Permissible Dose (MPD)
Agencies and Regulations
Introduction to Radiation Biology
Cell Anatomy
Radiation/Cell Interaction
Effects of Radiation

Prerequisite

Program admission level math and English competency

Credit Hours

5

Contact Hours Per Week

Class - 5

Lab - 0

SPECIFIC TECHNICAL

RAD 120 - Principles of Radiation Biology and Protection

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
RADIATION DETECTION AND MEASUREMENT		**5**	**0**
Units of measure	Define terms used to measure ionizing radiation such as rem, millirem, roentgen, and rad. Distinguish between units of measure for ionizing radiation.		
Monitoring devices	Discuss personnel monitoring devices in terms of types, purposes, characteristics, advantages, and disadvantages.		
Ionization chambers	List types of ionization chambers. Describe the theory of operation for ionization chambers.		
PATIENT PROTECTION		**3**	**0**
Beam limiting devices	Explain the relationship of beam limiting devices to patient radiation protection.		
Filtration	Discuss added and inherent filtration in terms of the effect on patient dosage.		

Recommended Outline	After completing this section, the student will:	Hours Class	Lab
Shielding	Explain the purpose and importance of patient shielding. Given a list of patient shielding devices and radiographic procedures, correlate the method of shielding to the radiographic procedure.		
Ten-day rule	Explain the ten-day rule and its application to female patients of childbearing age.		
Exposure factors	Explain the relationship of exposure factors to patient dosage.		
Film and screen combinations	Given various radiographic procedures, determine the desired film/screen combination that will result in an optimum diagnostic image with the minimum radiation exposure to the patient.		
Repeat radiographs	Discuss methods to avoid repeat radiographs.		
PERSONNEL PROTECTION		**6**	**0**
Room construction and design	Explain the use of primary and secondary radiation barriers. Discuss protection devices influencing room construction and design.		
Radiographic equipment and techniques	Explain how radiographic equipment/techniques are used to reduce personnel exposure during radiographic, fluoroscopic, mobile, and surgical procedures.		

Recommended Outline	After completing this section, the student will:	Hours Class	Lab
Personnel protective devices	Explain how personnel protective devices are used to reduce personnel exposure during radiographic, fluoroscopic, mobile, and surgical procedures.		
Patient restraint devices	Explain how patient restraint devices are used to reduce personnel exposure during radiographic, fluoroscopic, mobile, and surgical procedures.		
MAXIMUM PERMISSIBLE DOSE (MPD)		**2**	**0**
Definition	Define Maximum Permissible Dose.		
Formula	Using the MPD formula, calculate the dose limits for radiographers of various ages.		
Dose	Discuss MPD as it relates to the pregnant radiographer. Differentiate between whole body and body part doses for radiographers. Discuss the difference between occupational and general public radiation exposure.		
AGENCIES AND REGULATIONS		**2**	**0**
Agencies	Identify federal and state regulatory agencies.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Evolution of standards	Discuss historical perspectives relating to radiation protection.		
Regulations	Explain two purposes of Public Law 97-35.		
	Discuss state regulations regarding patient and personnel protection.		
Responsibilities	Describe the "ALARA" concept in regards to personnel and patient protection.		
	Discuss radiographer radiation protection responsibilities as they pertain to patients, personnel, and the public.		
INTRODUCTION TO RADIATION BIOLOGY		**2**	**0**
History	Discuss historical evidence of the effects of radiation.		
Interaction of radiation with matter	Describe concepts relating to the interaction of radiation with matter.		
Human anatomy as matter	Discuss the information concerning the human body as it relates to atomic structure.		
CELL ANATOMY		**3**	**0**
Structure	Review the structures involved in cellular anatomy.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Function	Describe the importance of the macromolecules in terms of cellular function.		
RADIATION/CELL INTERACTION		**19**	**0**
Definition	Define radiation/cell interaction.		
Effects	Discuss the effects of radiation on cells.		
Factors affecting cell response	Discuss the cellular factors that affect the radiosensitivity of each cell.		
Modifiers	Differentiate between radioprotectors and radiosensitizers.		
EFFECTS OF RADIATION		**8**	**0**
Acute exposure	Describe acute exposure in terms of somatic and genetic effects.		
Chronic exposure	Describe chronic exposure in terms of somatic and genetic effects.		

SPECIFIC TECHNICAL

RAD 120 - Principles of Radiation Biology and Protection

Resources

Bushong, S. C. (1988). *Radiologic science for technologists* (4th ed.). St. Louis: Mosby.

Frankel, R. (1976). *Radiation protection for radiologic technologists.* New York: McGraw-Hill.

Gurley, L. T., et al. (1986). *Introduction to radiologic technology* (2nd ed.). St. Louis: Mosby.

Hall, E. J. (1984). *Radiation and life* (2nd ed.). Elmsford, NY: Pergamon.

Noz, M. E., & Maguire, G. Q., Jr. (1985). *Radiation protection in the radiologic and health sciences* (2nd ed.). Philadelphia: Lea & Febiger.

Selman, J. (1985). *Fundamentals of x-ray and radium physics* (7th ed.). Springfield, IL: C. C. Thomas.

Statkiewicz, M. A., & Ritenour, E. R. (1983). *Radiation protection for student radiographers.* St. Louis: Mosby.

Travis, E. L. (1989). *Primer of medical radiobiology* (2nd ed.). Chicago: Year Book Medical.

SPECIFIC TECHNICAL

RAD 126 - Radiologic Technology Review

Course Overview

Course Description

Provides a review of basic knowledge from previous courses and helps the student prepare for national certification examinations for radiographers. Topics include: principles of radiographic exposure; radiographic procedures; anatomy, physiology, pathology, and terminology; radiologic science and equipment; radiation protection; and patient care techniques.

Competency Areas

Principles of Radiographic Exposure
Radiographic Procedures
Anatomy, Physiology, Pathology, and Terminology
Radiologic Science and Equipment
Radiation Protection
Patient Care Techniques

Prerequisites/Corequisites

RAD 134, RAD 138

Credit Hours

3

Contact Hours Per Week

Class - 2

D.Lab - 2

SPECIFIC TECHNICAL

RAD 126 - Radiologic Technology Review

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
PRINCIPLES OF RADIOGRAPHIC EXPOSURE		**5**	**5**
Recorded detail, density, distortion, and contrast	Review factors affecting recorded detail, density, distortion, and contrast. Discuss the relationships between density, distortion, contrast, and recorded detail.		
Film, screen, and/or grid combination selection	Review factors that govern the selection of films, screens, and grids. Discuss the relationship between films and screens.		
Conditions influencing choice of exposure	Review the effect of factors influencing exposure control such as the nature of the radiographic procedure; films, screens and grids selected; power setting used; and beam limitation and scatter. Perform exposure calculations for various radiographic procedures.		
Automatic exposure controls	Describe the advantages and disadvantages associated with the use of automatic exposure controls.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Discuss factors affecting the decision to use automatic exposure controls.		
Technique chart	Given a simulated radiographic procedure, use technique charts to select exposure factors.		
Film processing and quality assurance	Review film storage considerations.		
	Review radiographic identification procedures.		
	Discuss the daily and periodic maintenance for automatic film processors.		
	Discuss the procedures for loading and unloading film cassettes.		
Evaluation of radiographs	Discuss the criteria used to evaluate the diagnostic quality of radiographs.		
	List the possible causes of poor radiograph quality.		
RADIOGRAPHIC PROCEDURES		**5**	**5**
Patient positioning	Review positioning terminology.		
	Describe immobilization and positioning devices in terms of types and functions.		
	Given a radiographic procedure, state the appropriate breathing instructions for the patient.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Discuss positioning and technique variations for various radiographic procedures.		
Patient preparation	Given various radiographic procedures, describe the requisite procedures for patient preparation.		
Contrast media	List the types of contrast media.		
	Match contrast media with radiographic procedures.		
	Given a specific contrast medium, list the indications, contraindications, and the adverse reactions associated with its use.		
Specific radiographic procedures, positioning, and equipment	Given a list of routine and special radiographic procedures, list the steps for patient preparation and patient positioning.		
	Given a list of routine and special radiographic procedures, select the equipment needed and the exposure settings that are consistent with A.R.R.T. specifications.		
ANATOMY, PHYSIOLOGY, PATHOLOGY, AND TERMINOLOGY		**2.5**	**2.5**
Terminology	Given diagrams of the skeletal, digestive, circulatory, respiratory, reproductive, urinary, and nervous/ sensory systems, label each anatomical structure with its accepted medical term.		

Recommended Outline	After completing this section, the student will:	Hours Class	Lab
	Given a list of terms relating to physiology and pathology, define each.		
Anatomy and physiology	Evaluate radiographs of the skeletal, digestive, circulatory, respiratory, genitourinary, and nervous/sensory systems in terms of positioning accuracy, image quality, and anatomical structures and physiological functions visualized.		
Pathology	Evaluate radiographs of the skeletal, digestive, circulatory, respiratory, genitourinary, and nervous/sensory systems in terms of pathologies revealed.		
RADIOLOGIC SCIENCE AND EQUIPMENT		**2.5**	**2.5**
Radiographic equipment	Given diagrams of various radiographic equipment and accessories, label the component parts.		
	Discuss the differences in various types and models of portable radiographic equipment.		
	Discuss the differences in portable and nonportable radiographic equipment.		
X-ray tube operation	Describe the operation of an X-ray tube in terms of its theory of operation.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Describe the construction and function of an X-ray tube.		
	Determine the maximum allowable exposure factor for various radiographic procedures using an X-ray tube rating chart.		
	Given simulations of radiographic exposures and anode and tube housing cooling charts, determine the rate of anode and tube housing cooling.		
Maintenance and malfunctions	Review X-ray tube warm-up procedures for radiographic equipment of various manufacturers.		
	Perform safety checks of radiographic equipment and accessories such as lead aprons and gloves and collimator accuracy.		
	Identify symptoms of malfunctions in radiographic equipment.		
	Discuss reporting procedures for malfunctions of radiographic equipment.		
RADIATION PROTECTION		**2.5**	**2.5**
Patient protection	Describe the use and function of beam limiting devices, beam filtration, and shielding devices.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Describe the relationship between exposure factors and patient dosage.		
	Describe the nature and function of the ten-day rule.		
	Given various radiographic procedures, determine the film, screen, and exposure setting combination that will minimize the radiation dosage that patients receive.		
	Discuss methods to avoid repeat radiographs.		
Personnel protection	Describe the purpose of primary and secondary radiation barriers and room construction and design in terms of personnel protection.		
	Describe the radiographic equipment and techniques used to reduce personnel exposure during radiographic, fluoroscopic, mobile, and surgical procedures.		
	Discuss the types and purposes of personnel protective devices used during radiographic, fluoroscopic, mobile, and surgical procedures.		
	Describe the types, uses, and purposes of patient restraint devices in terms of reduction of personnel radiation exposure.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
Radiation monitoring devices	Describe personnel monitoring devices in terms of purposes, types, characteristics, advantages, and disadvantages.		
PATIENT CARE TECHNIQUES		**2.5**	**2.5**
Patient identity and procedure verification	Verify the patient's identity by asking the patient and/or by checking the wrist band. Verify the radiographic procedure requested by checking the procedure requisition form.		
Patient transfer	Review the principles of body mechanics applicable to patient care. Demonstrate procedures for patient transfer such as table to table, table to wheelchair, wheelchair to bed, bed to stretcher, the three-man lift, and drawsheet lift. Describe the procedures for turning patients who have severe trauma, unconsciousness, disorientation, or amputated limbs.		
Patient preparation and instruction	Given various radiographic procedures, list the patient preparation steps. Given various radiographic procedures, state the appropriate instructions to be given to the patient.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Given radiographic procedures using contrast agents, list the appropriate contrast agent for each procedure.		
	Given various radiographic procedures, discuss patient preparation in terms of procedures, indications, contraindications, and symptoms of and treatment for adverse reactions to contrast agents.		
Disinfection and sterilization	Given various radiographic procedures and patient information, describe the disinfection and sterilization procedures in terms of types and methods used.		
	Demonstrate the procedures for scrubbing, donning gowns and gloves, removing gowns and gloves, and handling sterile instruments.		
	Discuss procedures for handling and disposal of infectious wastes.		
Isolation	Given a list of isolation techniques, describe the function, purpose, and procedures for each.		
	Discuss the psychological considerations for the management of infectious patients.		
Vital signs	Describe the vital signs used to assess patient condition.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours Lab
	Identify normal values for measurements of temperature, pulse, blood pressure, and respiration.		
	Demonstrate the clinical measurement and recording of temperature, pulse, blood pressure, and respiration.		
Medical emergencies	Describe the symptoms of cardiac arrest, anaphylactic shock, convulsion, seizure, hemorrhage, apnea, emesis, aspiration, fractures, and diabetic coma/insulin reaction.		
	Describe the acute care procedures for cardiac arrest, anaphylactic shock, convulsion, seizure, hemorrhage, apnea, emesis, aspiration, fractures, and diabetic coma/insulin reaction.		
	Describe the use of medical equipment and supplies used to treat medical emergencies.		

SPECIFIC TECHNICAL

RAD 126 - Radiologic Technology Review

Resources

Anthony, C. P., & Thibodeau, G. A. (1983). *Structure and function of the body, time mirror.* St. Louis: Mosby.

Anthony, C. P., & Thibodeau, G. A. (1983). *Textbook of anatomy and physiology.* St. Louis: Mosby.

Armstrong, P., & Wastie, M. L. (1981). *X-ray diagnosis.* Boston: Blackwell Scientific.

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Brinbok, G. (1965). *Pathology for radiographers.* London: Butterworths.

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Carroll, Q. B. (1985). *Fuch's principles of radiographic exposure, processing, and quality control* (3rd ed.). Springfield, IL: C. C. Thomas.

Chabner, D. (1985). *The language of medicine* (3rd ed.). Philadelphia: W. B. Saunders.

Curry, T. S., Dowdey, J. E., & Murry, R. C., Jr. (1990). *Christensen's physics of diagnostic radiology* (4th ed.). Philadelphia: Lea & Febiger.

DeAngelis, R. V., & Edgar, M. (N.D.). *Radiography workbook two.* Marlboro, NJ: Health & Allied Science.

Ehrlich, R. A., & Givens, E. M. (1989). *Patient care in radiography* (3rd. ed). St. Louis: Mosby.

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Glanze, W. D., Anderson, K. N., & Anderson, L. E. (1986). *Mosby's medical and nursing dictionary* (2nd ed.). St. Louis: Mosby.

Gurley, L. T., et al. (1986). *Introduction to radiologic technology* (2nd ed.). St. Louis: Mosby.

Gylys, B. A., & Wedding, M. E. (1988). *Medical terminology: A systems approach* (2nd ed.). Philadelphia: F. A. Davis.

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Hall, E. J. (1984). *Radiation and life* (2nd ed.). Elmsford, NY: Pergamon.

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Kreel, L. (1981). *Clark's positioning in radiography* (Vol. II). (10th ed.). Chicago: Year Book Medical.

LaFleur, M. W., & Starr, W. K. (1988). *Exploring medical language.* St. Louis: Mosby.

Laudicina, P. (1989). *Applied pathology for radiographers*. Philadelphia: W. B. Saunders.

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SPECIFIC TECHNICAL

RAD 134 - Intermediate Clinical Radiography I

Course Overview

Course Description

Provides students with continued hospital setting work experience. Students improve skills in executing procedures introduced in Radiographic Procedures I and II and practiced in previous clinicals. Emphasis is placed on those procedures presented in Radiographic Procedures III and IV and practiced in previous clinicals. Topics include: equipment utilization; exposure techniques; and progress toward completion of clinical competencies through participation in and/or observation of gastrointestinal (GI), genitourinary (GU), and biliary system procedures, and routine and special cranial and facial radiography. Execution of radiographic procedures will be conducted under direct and indirect supervision.

Competency Areas

Equipment Utilization
Exposure Techniques
Participation in and/or Observation of Gastrointestinal (GI), Genitourinary (GU), and Biliary System Procedures
Participation in and/or Observation of Cranial and Facial Radiography

Prerequisites

RAD 109, RAD 133

Prerequisites/Corequisites

RAD 113, RAD 114

Credit Hours

7

Contact Hours Per Week

Class - 0

O.B.I. - 21

SPECIFIC TECHNICAL

RAD 134 - Intermediate Clinical Radiography I

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
EQUIPMENT UTILIZATION		**0**	**(210)**
Equipment inspection	Perform safety checks of radiographic equipment and accessories (e.g., lead aprons and gloves, collimator accuracy). Recognize malfunctions in the radiographic unit (including table, tube, and accessories). Note difficulties experienced which might assist in locating the cause of the malfunction. Report malfunctions in the radiographic unit (including table, tube, and accessories). Inspect and clean screens and cassettes regularly to identify and remove causes of artifacts. Perform "start up" and/or "shutdown" procedures on the automatic processor (e.g., adjust water, removal and cleaning of "cross-over" bars). Recognize malfunctions in the automatic processor.		

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
	Note difficulties experienced which might assist in locating the cause of the malfunction.		
	Report malfunctions in the automatic processor.		
	Monitor the performance of the automatic processor using sensitometry.		
	Clean, wash, disinfect, and/or sterilize facilities and equipment (e.g., cassettes, tabletops) and dispose of contaminated items in preparation for the next examination.		
X-ray tube warm-up	Warm-up the x-ray tube to achieve proper operating conditions by following the manufacturer's prescribed sequence of steps.		
EXPOSURE TECHNIQUES		**0**	**(210)**
Film storage and processing	Store film/cassette in a manner which will reduce the possibility of accidentally exposing or reexposing film.		
	Imprint proper identification information onto film using either the radiographic, photographic, or light imprinter method.		
	Process exposed film by unloading the cassette and feeding it into the automatic processor.		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Reload cassettes by selecting film of proper size and type.	
	Record required information on the request form following performance of examination (may include technologist identification, patient data, billing codes, number and size of films, technique, or other information as required by department protocol).	
	Combine radiographic requisition and radiographs for interpretation and filing.	
Technique development	Determine appropriate exposure factors using calipers, technique charts, and tube rating charts for guidance.	
	Modify exposure factors for circumstances such as voluntary and involuntary motion, plaster casts, pathological conditions, and/or patient's inability to cooperate.	
	Restrict beam to limit exposure to area of interest and to improve image quality.	
	Set kVp, mA, and time or automated exposure system to achieve optimum image quality, safe operating conditions, and to minimize radiation exposure.	

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
Technique evaluation	Evaluate radiographs using a view box to make certain that radiographs contain proper identification and are of diagnostic quality. Determine corrective measures if radiograph is not of diagnostic quality.		
PARTICIPATION IN AND/OR OBSERVATION OF GASTROINTESTINAL (GI), GENITOURINARY (GU), AND BILIARY SYSTEM PROCEDURES		**0**	**(210)**
Gastrointestinal system	Observe and/or participate in patient preparation procedures for radiographic/fluoroscopic examinations of the gastrointestinal system. Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the gastrointestinal system. Observe and/or participate in routine radiographic/fluoroscopic procedures of the gastrointestinal system. Evaluate the quality of radiographs and photospots of the gastrointestinal system in terms of positioning accuracy, image quality, and anatomical structures revealed. Identify the special considerations for gastrointestinal procedures relating to the avoidance of repeated procedures.		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Reload cassettes by selecting film of proper size and type.	
	Record required information on the request form following performance of examination (may include technologist identification, patient data, billing codes, number and size of films, technique, or other information as required by department protocol).	
	Combine radiographic requisition and radiographs for interpretation and filing.	
Technique development	Determine appropriate exposure factors using calipers, technique charts, and tube rating charts for guidance.	
	Modify exposure factors for circumstances such as voluntary and involuntary motion, plaster casts, pathological conditions, and/or patient's inability to cooperate.	
	Restrict beam to limit exposure to area of interest and to improve image quality.	
	Set kVp, mA, and time or automated exposure system to achieve optimum image quality, safe operating conditions, and to minimize radiation exposure.	

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
Technique evaluation	Evaluate radiographs using a view box to make certain that radiographs contain proper identification and are of diagnostic quality. Determine corrective measures if radiograph is not of diagnostic quality.		
PARTICIPATION IN AND/OR OBSERVATION OF GASTROINTESTINAL (GI), GENITOURINARY (GU), AND BILIARY SYSTEM PROCEDURES		**0**	**(210)**
Gastrointestinal system	Observe and/or participate in patient preparation procedures for radiographic/fluoroscopic examinations of the gastrointestinal system. Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the gastrointestinal system. Observe and/or participate in routine radiographic/fluoroscopic procedures of the gastrointestinal system. Evaluate the quality of radiographs and photospots of the gastrointestinal system in terms of positioning accuracy, image quality, and anatomical structures revealed. Identify the special considerations for gastrointestinal procedures relating to the avoidance of repeated procedures.		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in the identification of and care for acute reactions to contrast media.	
Genitourinary procedures	Participate in and/or observe patient preparation procedures for radiographic/fluoroscopic examinations of the genitourinary system.	
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the genitourinary system.	
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the genitourinary system.	
	Evaluate the quality of radiographs and photospots of the genitourinary system in terms of positioning accuracy, image quality, and anatomical structures revealed.	
	Identify the special considerations for genitourinary procedures relating to the avoidance of repeated procedures.	
	Observe and/or participate in the identification of and care for acute reactions to contrast media.	
Biliary system	Observe and or participate in patient preparation procedures for radiographic/fluoroscopic examinations of the biliary system.	

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the biliary system.		
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the biliary system.		
	Evaluate the quality of radiographs and photospots of the biliary system in terms of positioning accuracy, image quality, and anatomical structures revealed.		
	Identify the special considerations for biliary system procedures relating to the avoidance of repeated procedures.		
	Observe and/or participate in the identification of and care for acute reactions to contrast media.		
PARTICIPATION IN AND/OR OBSERVATION OF CRANIAL AND FACIAL RADIOGRAPHY		**0**	**(210)**
Cranial procedures	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the cranium.		
	Observe and/or participate in routine radiographic procedures involving cranial procedures.		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in the evaluation of cranial radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
Facial procedures	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving facial structures.	
	Observe and/or participate in routine radiographic procedures involving facial structures.	
	Observe and/or participate in the evaluation of facial radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
Competency completion evaluation	Evaluate the number, types, and degree to which clinical competencies have been completed and mastered.	
Competency completion planning	Develop a plan in conjunction with on-site clinical supervisors and technical institute faculty to outline future completion and mastery of clinical competencies contained in this course.	
Continuing education/independent study	Identify an area of concern or interest related to the content of this clinical experience, and research, review a publication, or otherwise explore this topic to your satisfaction.	

SPECIFIC TECHNICAL

RAD 134 - Intermediate Clinical Radiography I

Resources

Ballinger, P. (1985). *Merrill's atlas of radiographic positions and radiographic procedures* (6th ed.). St. Louis: Mosby.

Bontrager, K. (1987). *Textbook of radiographic positioning and related anatomy* (2nd ed.). St. Louis: Mosby.

Ehrlich, R. A., & Givens, E. M. (1989). *Patient care in radiography* (3rd ed.). St. Louis: Mosby.

Kreel, L. (1980). *Clark's positioning in radiography* (Vol. I). (10th ed.). Chicago: Year Book Medical.

Kreel, L. (1981). *Clark's positioning in radiography* (Vol. II). (10th ed.). Chicago: Year Book Medical.

Meschan, I. (1978). *Radiographic positioning and related anatomy* (2nd ed.). Philadelphia: W. B. Saunders.

Torres, L. S., & Morrill, C. (1983). *Basic medical techniques and patient care for radiologic technologists* (2nd ed.). Philadelphia: Lippincott.

SPECIFIC TECHNICAL

RAD 135 - Intermediate Clinical Radiography II

Course Overview

Course Description

Provides students with continued hospital setting work experience. Students continue to develop proficiency in executing procedures introduced in Radiographic Procedures I, II, III, and IV. Emphasis is placed on those procedures presented in Radiographic Procedures IV and Special Radiographic Procedures. Topics include: sterile techniques; and progress toward completion of clinical competencies through participation in and/or observation of minor special procedures, special equipment use, genitourinary system procedures, and routine and special cranial and facial radiography. Execution of radiographic procedures will be conducted under direct and indirect supervision.

Competency Areas

Sterile Techniques
Participation in and/or Observation of Minor Special Procedures, Special Equipment Use, and Genitourinary System Procedures
Participation in and/or Observation of Cranial and Facial Radiography

Prerequisite

RAD 134

Prerequisite/Corequisite

RAD 118

Credit Hours

7

Contact Hours Per Week

Class - 0

O.B.I. - 21

SPECIFIC TECHNICAL

RAD 135 - Intermediate Clinical Radiography II

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
STERILE TECHNIQUES		**0**	**(210)**
Sterilization	Observe and/or participate in methods of sterilizing radiographic equipment and examination rooms. Observe and/or participate in the sterilization processes preparatory to catheterization.		
Gowning and gloving	Observe and/or participate in the use of "open" and "closed" gowning and gloving methods.		
Sterile procedures	Observe and/or participate in the use of techniques to open sterile packages where the person opening the package is either sterile or unsterile. Observe and/or participate in "scrubbing in" a patient. Observe and/or participate in creating a sterile field, gowning and gloving oneself, and assisting a radiologist and/or physician.		

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
PARTICIPATION IN AND/OR OBSERVATION OF MINOR SPECIAL PROCEDURES, SPECIAL EQUIPMENT USE, AND GENITOURINARY SYSTEM PROCEDURES		**0**	**(210)**
Special minor procedures	Observe and/or participate in special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngio-pancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms.		
	Observe and/or participate in the preparation for use, operation, and maintenance of equipment used to perform special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngiopancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms.		
	Observe and/or participate in the use and maintenance of special radiographic equipment such as image intensifiers, magnification radiographic equipment, bi-plane equipment, recording equipment, rapid film changers, injectors, program selectors, and other miscellaneous radiographic equipment.		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
Patient preparation	Observe and/or participate in the preparation of patients undergoing special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngiopancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms.	
Post-procedural techniques	Observe and/or participate in the post-procedural care of patients who have undergone special minor radiographic procedures.	
Evaluation	Observe and/or participate in the evaluation of special minor procedure radiographs in terms of anatomy visualized and pathologies revealed.	
Contrast media	Observe and/or participate in the selection and administration of contrast media used for special radiographic procedures. Observe and/or participate in the diagnosis of and treatment for adverse reactions to contrast media.	
Angiographic and interventional procedures	Observe and/or participate in special radiographic procedures such as cerebral, visceral, peripheral, and digital subtraction angiograms. Observe catheterization techniques.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe the Seldinger technique.	
	Observe and/or participate in interventional techniques such as infusion therapy, extractions, embolizations, PTA/PTLAs, and percutaneous needle studies.	
Genitourinary procedures	Participate in and/or observe patient preparation procedures for radiographic/fluoroscopic examinations of the genitourinary system.	
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the genitourinary system.	
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the genitourinary system.	
	Evaluate the quality of radiographs and photospots of the genitourinary system in terms of positioning accuracy, image quality, and anatomical structures revealed.	
	Identify the special considerations for genitourinary procedures relating to the avoidance of repeated procedures.	
	Observe and/or participate in the identification of and care for acute reactions to contrast media.	

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
PARTICIPATION IN AND/OR OBSERVATION OF CRANIAL AND FACIAL RADIOGRAPHY		**0**	**(210)**
Cranial procedures	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the cranium.		
	Observe and/or participate in routine radiographic procedures involving the cranium.		
	Observe and/or participate in the evaluation of cranial radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		
Facial procedures	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the facial anatomy.		
	Observe and/or participate in routine radiographic procedures involving the facial anatomy.		
	Observe and/or participate in the evaluation of facial radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.		
Competency completion evaluation	Evaluate the number, types, and degree to which clinical competencies have been completed and mastered.		

Recommended Outline	After completing this section, the student will:	Hours Class	Hours OBI
Competency completion planning	Develop a plan in conjunction with on-site clinical supervisors and technical institute faculty to outline future completion and mastery of clinical competencies contained in this course.		
Continuing education/independent study	Identify an area of concern or interest related to the content of this clinical experience, and research, review a publication, or otherwise explore this topic to your satisfaction.		

SPECIFIC TECHNICAL

RAD 135 - Intermediate Clinical Radiography II

Resources

Ballinger, P. W. (1990). *Merrill's atlas of radiographic positions and radiographic procedures* (7th ed.). St. Louis: Mosby.

Bontrager, K. (1987). *Textbook of radiographic positioning and related anatomy* (2nd ed.). St. Louis: Mosby.

Kreel, L. (1980). *Clark's positioning in radiography* (Vol. I). (10th ed.). Chicago: Year Book Medical.

Kreel, L. (1981). *Clark's positioning in radiography* (Vol. II). (10th ed.). Chicago: Year Book Medical.

Meschan, I. (1978). *Radiographic positioning and related anatomy* (2nd ed.). Philadelphia: W. B. Saunders.

Snopek, A. M. (1984). *Fundamentals of special radiographic procedures* (2nd ed.). Philadelphia: W. B. Saunders.

Tortorici, M. R. (1982). *Fundamentals of angiography*. St. Louis: Mosby.

SPECIFIC TECHNICAL

RAD 136 - Intermediate Clinical Radiography III

Course Overview

Course Description

Provides students with continued hospital setting work experience. Students demonstrate increased proficiency levels in skills introduced in Radiographic Procedures I, II, III, IV, and Special Radiographic Procedures and practiced in previous clinical radiography courses. Emphasis will be placed on those procedures introduced in Special Radiographic Procedures. Topics include: advanced radiographic anatomy; equipment utilization; exposure techniques; sterile techniques; and progress toward completion of clinical competencies through participation in and/or observation of angiographic, interventional, minor special, and special genitourinary system procedures, and special equipment use. Execution of radiographic procedures will be conducted under direct and indirect supervision.

Competency Areas

Advanced Radiographic Anatomy
Equipment Utilization
Exposure Techniques
Sterile Techniques
Participation in and/or Observation of Angiographic, Interventional, Minor Special, and Special Genitourinary System Procedures
Participation in and/or Observation of Special Equipment Use

Prerequisites

RAD 118, RAD 135

Credit Hours

7

Contact Hours Per Week

Class - 0

O.B.I. - 21

SPECIFIC TECHNICAL

RAD 136 - Intermediate Clinical Radiography III

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
ADVANCED RADIOGRAPHIC ANATOMY		**0**	**(210)**
Minor and interventional anatomy	Identify the anatomical structures revealed in radiographs of minor radiographic procedures such as angiograms, bronchograms, ERCPs, myelograms, sialograms, venograms, and mammograms/xerograms. Identify the anatomical structures revealed in radiographs of interventional procedures.		
EQUIPMENT UTILIZATION		**0**	**(210)**
Equipment inspection	Perform safety checks of radiographic equipment and accessories (e.g., lead aprons and gloves, collimator accuracy). Recognize malfunctions in the radiographic unit (including table, tube, and accessories). Note difficulties experienced which might assist in locating the cause of the malfunction. Report malfunctions in the radiographic unit (including table, tube, and accessories).		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Inspect and clean screens and cassettes regularly to identify and remove causes of artifacts.	
	Perform "start up" and/or "shutdown" procedures on the automatic processor (e.g., adjust water, removal and cleaning of "cross-over" bars).	
	Recognize malfunctions in the automatic processor.	
	Note difficulties experienced which might assist in locating the cause of the malfunction.	
	Report malfunctions in the automatic processor.	
	Monitor the performance of the automatic processor using sensitometry.	
	Clean, wash, disinfect, and/or sterilize facilities and equipment (e.g., cassettes, tabletops) and dispose of contaminated items in preparation for the next examination.	
X-ray tube warm-up	Warm-up the x-ray tube to achieve proper operating conditions by following the manufacturer's prescribed sequence of steps.	

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
EXPOSURE TECHNIQUES		**0**	**(210)**
Film storage and processing	Store film/cassette in a manner which will reduce the possibility of accidentally exposing or reexposing the film. Imprint proper identification information onto the film using either the radiographic, photographic, or light imprinter method. Process exposed film by unloading the cassette and feeding it into the automatic processor. Reload cassettes by selecting film of proper size and type. Record required information on the request form following performance of examination (may include technologist identification, patient data, billing codes, number and size of films, technique, or other information as required by department protocol). Combine radiographic requisition and radiographs for interpretation and filing.		
Technique development	Determine appropriate exposure factors using calipers, technique charts, and tube rating charts for guidance.		

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
	Modify exposure factors for circumstances such as voluntary and involuntary motion, plaster casts, pathological conditions, and/or patient's inability to cooperate.		
	Restrict beam to limit exposure to area of interest and to improve image quality.		
	Set kVp, mA, and time or automated exposure system to achieve optimum image quality, safe operating conditions, and to minimize radiation exposure.		
Technique evaluation	Evaluate radiographs using a view box to make certain that radiographs contain proper identification and are of diagnostic quality.		
	Determine corrective measures if the radiograph is not of diagnostic quality.		
STERILE TECHNIQUES		**0**	**(210)**
Sterilization	Observe and/or participate in methods of sterilizing radiographic equipment and examination rooms.		
	Observe and/or participate in the sterilization processes preparatory to catheterization.		
Gowning and gloving	Observe and/or participate in the use of "open" and "closed" gowning and gloving methods.		

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
Sterile procedures	Identify the sterile techniques required for specific minor and interventional radiographic/ fluoroscopic procedures. Observe and/or participate in the use of techniques to open sterile packages where the person opening the package is either sterile or unsterile. Observe and/or participate in "scrubbing in" a patient. Observe and/or participate in creating a sterile field, gowning and gloving oneself, and assisting a radiologist and/or physician.		
PARTICIPATION IN AND/OR OBSERVATION OF ANGIOGRAPHIC, INTERVENTIONAL, MINOR SPECIAL, AND SPECIAL GENITOURINARY SYSTEM PROCEDURES		**0**	**(210)**
Angiography	Observe and/or participate in special radiographic procedures such as cerebral, visceral, peripheral, and digital subtraction angiograms. Observe catheterization techniques. Observe the Seldinger technique.		
Interventional procedures	Observe and/or participate in interventional techniques such as infusion therapy, extractions, embolizations, PTA/PTLAs, and percutaneous needle studies.		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
Minor special procedures	Observe and/or participate in angiographic, interventional, minor special, and special genitourinary system procedures. Observe and/or participate in special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngio-pancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms. Observe and/or participate in the preparation for use, operation, and maintenance of equipment used to perform special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngiopancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms. Observe and/or participate in the use and maintenance of special radiographic equipment such as image intensifiers, magnification radiographic equipment, biplane equipment, recording equipment, rapid film changers, injectors, program selectors, and other miscellaneous radiographic equipment.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
Patient preparation	Observe and/or participate in the preparation of patients undergoing special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngiopancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms.	
Post-procedural techniques	Observe and/or participate in the post-procedural care of patients who have undergone special minor radiographic procedures.	
Evaluation	Observe and/or participate in the evaluation of special minor procedure radiographs in terms of anatomy visualized and pathologies revealed.	
Contrast media	Observe and/or participate in the selection and administration of contrast media used for special radiographic procedures. Observe and/or participate in the diagnosis of and treatment for adverse reactions to contrast media.	
Genitourinary procedures	Participate in and/or observe patient preparation procedures for radiographic/fluoroscopic examinations of the genitourinary system.	

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the genitourinary system.		
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the genitourinary system.		
	Evaluate the quality of radiographs and photospots of the genitourinary system in terms of positioning accuracy, image quality, and anatomical structures revealed.		
	Identify the special considerations for genitourinary procedures relating to the avoidance of repeated procedures.		
	Observe and/or participate in the identification of and care for acute reactions to contrast media.		
PARTICIPATION IN AND/OR OBSERVATION OF SPECIAL EQUIPMENT USE		**0**	**(210)**
Special minor procedures	Observe and/or participate in special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngio-pancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms.		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in the preparation for use, operation, and maintenance of equipment used to perform special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngiopancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms.	
	Observe and/or participate in the use and maintenance of special radiographic equipment such as image intensifiers, magnification radiographic equipment, bi-plane equipment, recording equipment, rapid film changers, injectors, program selectors, and other miscellaneous radiographic equipment.	
Patient preparation	Observe and/or participate in the preparation of patients undergoing special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngiopancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms.	
Post-procedural care techniques	Observe and/or participate in the post-procedural care of patients who have undergone special minor radiographic procedures.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
Evaluation	Observe and/or participate in the evaluation of special minor procedure radiographs in terms of anatomy visualized and pathologies revealed.	
Contrast media	Observe and/or participate in the selection and administration of contrast media used for special radiographic procedures. Observe and/or participate in the diagnosis of and treatment for adverse reactions to contrast media.	
Angiographic and interventional procedures	Observe and/or participate in special radiographic procedures such as cerebral, visceral, peripheral, and digital subtraction angiograms. Observe catheterization techniques. Observe the Seldinger technique. Observe and/or participate in interventional techniques such as infusion therapy, extractions, embolizations, PTA/PTLAs, and percutaneous needle studies.	
Genitourinary procedures	Participate in and/or observe patient preparation procedures for radiographic/fluoroscopic examinations of the genitourinary system.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the genitourinary system.	
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the genitourinary system.	
	Evaluate the quality of radiographs and photospots of the genitourinary system in terms of positioning accuracy, image quality, and anatomical structures revealed.	
	Identify the special considerations for genitourinary procedures relating to the avoidance of repeated procedures.	
	Observe and/or participate in the identification of and care for acute reactions to contrast media.	
Competency completion evaluation	Evaluate the number, types, and degree to which clinical competencies have been completed and mastered.	
Competency completion planning	Develop a plan in conjunction with on-site clinical supervisors and technical institute faculty to outline future completion and mastery of clinical competencies contained in this course.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
Continuing education/independent study	Identify an area of concern or interest related to the content of this clinical experience, and research, review a publication, or otherwise explore this topic to your satisfaction.	

SPECIFIC TECHNICAL

RAD 136 - Intermediate Clinical Radiography III

Resources

Ballinger, P. W. (1990). *Merrill's atlas of radiographic positions and radiographic procedures* (7th ed.). St. Louis: Mosby.

Bontrager, K. (1987). *Textbook of radiographic positioning and related anatomy* (2nd ed.). St. Louis: Mosby.

Kreel, L. (1980). *Clark's positioning in radiography* (Vol. I). (10th ed.). Chicago: Year Book Medical.

Kreel, L. (1981). *Clark's positioning in radiography* (Vol. II). (10th ed.). Chicago: Year Book Medical.

Meschan, I. (1978). *Radiographic positioning and related anatomy* (2nd ed.). Philadelphia: W. B. Saunders.

Snopek, A. M. (1984). *Fundamentals of special radiographic procedures* (2nd ed.). Philadelphia: W. B. Saunders.

Tortorici, M. R. (1982). *Fundamentals of angiography*. St. Louis: Mosby.

SPECIFIC TECHNICAL

RAD 137 - Advanced Clinical Radiography I

Course Overview

Course Description

Provides a hospital setting in which students continue to develop proficiency levels in skills introduced in Radiographic Procedures I, II, III, IV, and Special Radiographic Procedures and practiced in previous clinical radiography courses. Emphasis is placed on skill improvement through execution of special radiographic procedures under indirect supervision. Topics include: equipment utilization, exposure techniques, and progress toward completion of clinical competencies through participation in and/or observation of routine and special radiographic procedures. Execution of radiographic procedures will be conducted under direct and indirect supervision.

Competency Areas

Equipment Utilization
Exposure Techniques
Participation in and/or Observation of
Routine and Special Radiographic Procedures

Prerequisite

RAD 136

Prerequisite/Corequisite

RAD 120

Credit Hours

9

Contact Hours Per Week

Class - 0

O.B.I. - 28

SPECIFIC TECHNICAL

RAD 137 - Advanced Clinical Radiography I

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
EQUIPMENT UTILIZATION		**0**	**(280)**
Equipment inspection	Perform safety checks of radiographic equipment and accessories (e.g., lead aprons and gloves, collimator accuracy). Recognize malfunctions in the radiographic unit (including table, tube, and accessories). Note difficulties experienced which might assist in locating the cause of the malfunction. Report malfunctions in the radiographic unit (including table, tube, and accessories). Inspect and clean screens and cassettes regularly to identify and remove causes of artifacts. Perform "start up" and/or "shutdown" procedures on the automatic processor (e.g., adjust water, removal and cleaning of "cross-over" bars). Recognize malfunctions in the automatic processor.		

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
	Note difficulties experienced which might assist in locating the cause of the malfunction.		
	Report malfunctions in the automatic processor.		
	Monitor the performance of the automatic processor using sensitometry.		
	Clean, wash, disinfect, and/or sterilize facilities and equipment (e.g., cassettes, tabletops) and dispose of contaminated items in preparation for the next examination.		
X-ray tube warm-up	Warm-up the x-ray tube to achieve proper operating conditions by following the manufacturer's prescribed sequence of steps.		
EXPOSURE TECHNIQUES		**0**	**(280)**
Film storage and processing	Store film/cassette in a manner which will reduce the possibility of accidentally exposing or reexposing the film.		
	Imprint proper identification information onto the film using either the radiographic, photographic, or light imprinter method.		
	Process exposed film by unloading the cassette and feeding it into the automatic processor.		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Reload cassettes by selecting film of proper size and type.	
	Record required information on the request form following performance of examination (may include technologist identification, patient data, billing codes, number and size of films, technique, or other information as required by department protocol).	
	Combine radiographic requisition and radiographs for interpretation and filing.	
Technique development	Determine appropriate exposure factors using calipers, technique charts, and tube rating charts for guidance.	
	Modify exposure factors for circumstances such as voluntary and involuntary motion, plaster casts, pathological conditions, and/or the patient's inability to cooperate.	
	Restrict beam to limit exposure to area of interest and to improve image quality.	
	Set kVp, mA, and time or automated exposure system to achieve optimum image quality, safe operating conditions, and to minimize radiation exposure.	

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
Technique evaluation	Evaluate radiographs using view box to make certain that radiographs contain proper identification and are of diagnostic quality. Determine corrective measures if the radiograph is not of diagnostic quality.		
PARTICIPATION IN AND/OR OBSERVATION OF ROUTINE AND SPECIAL RADIOGRAPHIC PROCEDURES		**0**	**(280)**
Body cavities, shoulder girdle, and upper extremities	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the thoracic cavity. Observe and/or participate in routine radiographic procedures involving the thoracic cavity. Observe and/or participate in the evaluation of thoracic cavity radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized. Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the abdominal cavity. Observe and/or participate in routine radiographic procedures involving the abdominal cavity.		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in the evaluation of abdominal cavity radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the upper extremities.	
	Observe and/or participate in routine radiographic procedures involving the upper extremities.	
	Observe and/or participate in the evaluation of upper extremity radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the shoulder girdle.	
	Observe and/or participate in routine radiographic procedures involving the shoulder girdle.	
	Observe and/or participate in the evaluation of shoulder girdle radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
Lower extremities, pelvic girdle, spine, and bony thorax	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the lower extremities.	
	Observe and/or participate in routine radiographic procedures involving the lower extremities.	
	Observe and/or participate in the evaluation of lower extremity radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the pelvic girdle.	
	Observe and/or participate in routine radiographic procedures involving the pelvic girdle.	
	Observe and/or participate in the evaluation of pelvic girdle radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the spine.	
	Observe and/or participate in routine radiographic procedures involving the spine.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in the evaluation of spinal radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the bony thorax.	
	Observe and/or participate in the evaluation of bony thorax radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
	Observe and/or participate in routine radiographic procedures involving the bony thorax.	
Gastrointestinal, genitourinary, and biliary systems	Observe and/or participate in patient preparation procedures for radiographic/fluoroscopic examinations of the gastrointestinal system.	
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the gastrointestinal system.	
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the gastrointestinal system.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Evaluate the quality of radiographs and photospots of the gastrointestinal system in terms of positioning accuracy, image quality, and anatomical structures revealed.	
	Identify the special considerations for gastrointestinal procedures relating to the avoidance of repeated procedures.	
	Observe and/or participate in the identification of and care for acute reactions to contrast media.	
	Observe and/or participate in patient preparation procedures for radiographic/fluoroscopic examinations of the genitourinary system.	
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the genitourinary system.	
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the genitourinary system.	
	Evaluate the quality of radiographs and photospots of the genitourinary system in terms of positioning accuracy, image quality, and anatomical structures revealed.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Identify the special considerations for genitourinary procedures relating to the avoidance of repeated procedures.	
	Observe and/or participate in the identification of and care for acute reactions to contrast media.	
	Observe and/or participate in patient preparation procedures for radiographic/fluoroscopic examinations of the biliary system.	
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the biliary system.	
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the biliary system.	
	Evaluate the quality of radiographs and photospots of the biliary system in terms of positioning accuracy, image quality, and anatomical structures revealed.	
	Identify the special considerations for biliary system procedures relating to the avoidance of repeated procedures.	
	Observe and/or participate in the identification of and care for acute reactions to contrast media.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
Cranial and facial radiography	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the cranium.	
	Observe and/or participate in routine radiographic procedures involving cranial procedures.	
	Observe and/or participate in the evaluation of cranial radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving facial structures.	
	Observe and/or participate in routine radiographic procedures involving facial structures.	
	Observe and/or participate in the evaluation of facial radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
Special procedures	Observe and/or participate in special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngio-pancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in the preparation for use, operation, and maintenance of equipment used to perform special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngiopancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms.	
	Observe and/or participate in the use and maintenance of special radiographic equipment such as image intensifiers, magnification radiographic equipment, bi-plane equipment, recording equipment, rapid film changers, injectors, program selectors, and other miscellaneous radiographic equipment.	
	Observe and/or participate in the preparation of patients undergoing special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngiopancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms.	
	Observe and/or participate in the post-procedural care of patients who have undergone special minor radiographic procedures.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in the evaluation of special minor procedure radiographs in terms of positioning accuracy, image quality, anatomy visualized, and pathologies revealed.	
	Observe and/or participate in the selection and administration of contrast media used for special radiographic procedures.	
	Observe and/or participate in the diagnosis of and treatment for adverse reactions to contrast media.	
	Observe and/or participate in special radiographic procedures such as cerebral, visceral, peripheral, and digital subtraction angiograms.	
	Observe catheterization techniques.	
	Observe the Seldinger technique.	
	Observe and/or participate in interventional techniques such as infusion therapy, extractions, embolizations, PTA/PTLAs, and percutaneous needle studies.	
	Participate in and/or observe patient preparation procedures for radiographic/fluoroscopic examinations of the genitourinary system.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the genitourinary system.	
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the genitourinary system.	
	Evaluate the quality of radiographs and photospots of the genitourinary system in terms of positioning accuracy, image quality, and anatomical structures revealed.	
	Identify the special considerations for genitourinary procedures relating to the avoidance of repeated procedures.	
	Observe and/or participate in the identification of and care for acute reactions to contrast media.	
Competency completion evaluation	Evaluate the number, types, and degree to which clinical competencies have been completed and mastered.	
Competency completion planning	Develop a plan in conjunction with on-site clinical supervisors and technical institute faculty to outline future completion and mastery of clinical competencies contained in this course.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
Continuing education/independent study	Identify an area of concern or interest related to the content of this clinical experience, and research, review a publication, or otherwise explore this topic to your satisfaction.	

SPECIFIC TECHNICAL

RAD 137 - Advanced Clinical Radiography I

Resources

Ballinger, P. W. (1990). *Merrill's atlas of radiographic positions and radiographic procedures* (7th ed.). St. Louis: Mosby.

Bontrager, K. (1987). *Textbook of radiographic positioning and related anatomy* (2nd ed.). St. Louis: Mosby.

Kreel, L. (1980). *Clark's positioning in radiography* (Vol. I). (10th ed.). Chicago: Year Book Medical.

Kreel, L. (1981). *Clark's positioning in radiography* (Vol. II). (10th ed.). Chicago: Year Book Medical.

Meschan, I. (1978). *Radiographic positioning and related anatomy* (2nd ed.). Philadelphia: W. B. Saunders.

Snopek, A. M. (1984). *Fundamentals of special radiographic procedures* (2nd ed.). Philadelphia: W. B. Saunders.

Tortorici, M. R. (1982). *Fundamentals of angiography*. St. Louis: Mosby.

SPECIFIC TECHNICAL

RAD 138 - Advanced Clinical Radiography II

Course Overview

Course Description

Provides a culminating hospital setting work experience which allows the students to synthesize information and procedural instruction provided throughout the program. Emphasis is placed on skill level improvements and final completion of all required clinical competencies presented in previous courses and practiced in previous clinical radiography courses. Topics include: equipment utilization, exposure techniques, and completion of all clinical competencies through participation in and/or observation of routine and special radiographic procedures. Execution of radiographic procedures will be conducted under direct and indirect supervision.

Competency Areas

Equipment Utilization
Exposure Techniques
Participation in and/or Observation of
  Routine and Special Radiographic Procedures
Final Completion of All Required Clinical Competencies

Prerequisite

RAD 137

Credit Hours

9

Contact Hours Per Week

Class - 0

O.B.I. - 28

SPECIFIC TECHNICAL

RAD 138 - Advanced Clinical Radiography II

Course Outline

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
EQUIPMENT UTILIZATION		**0**	**(280)**
Equipment inspection	Perform safety checks of radiographic equipment and accessories (e.g., lead aprons and gloves, collimator accuracy).		
	Recognize malfunctions in the radiographic unit (including table, tube, and accessories).		
	Note difficulties experienced which might assist in locating the cause of the malfunction.		
	Report malfunctions in the radiographic unit (including table, tube, and accessories).		
	Inspect and clean screens and cassettes regularly to identify and remove causes of artifacts.		
	Perform "start up" and/or "shutdown" procedures on the automatic processor (e.g., adjust water, removal and cleaning of "cross-over" bars).		
	Recognize malfunctions in the automatic processor.		

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
	Note difficulties experienced which might assist in locating the cause of the malfunction.		
	Report malfunctions in the automatic processor.		
	Monitor the performance of the automatic processor.		
	Clean, wash, disinfect, and/or sterilize facilities and equipment (e.g., cassettes, tabletops) and dispose of contaminated items in preparation for the next examination.		
X-ray tube warm-up	Warm-up the x-ray tube to achieve proper operating conditions by following the manufacturer's prescribed sequence of steps.		
EXPOSURE TECHNIQUES		**0**	**(280)**
Film storage and processing	Store film/cassette in a manner which will reduce the possibility of accidentally exposing or reexposing the film.		
	Imprint proper identification information onto the film using either the radiographic, photographic, or light imprinter method.		
	Process exposed film by unloading the cassette and feeding it into the automatic processor.		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Reload cassettes by selecting film of proper size and type.	
	Record required information on the request form following performance of examination (may include technologist identification, patient data, billing codes, number and size of films, technique, or other information as required by department protocol).	
	Combine radiographic requisition and radiographs for interpretation and filing.	
Technique development	Determine appropriate exposure factors using calipers, technique charts, and tube rating charts for guidance.	
	Modify exposure factors for circumstances such as voluntary and involuntary motion, plaster casts, pathological conditions, and/or the patient's inability to cooperate.	
	Restrict beam to limit exposure to area of interest and to improve image quality.	
	Set kVp, mA, and time or automated exposure system to achieve optimum image quality, safe operating conditions, and to minimize radiation exposure.	

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
Technique evaluation	Evaluate radiographs using view box to make certain that radiographs contain proper identification and are of diagnostic quality. Determine corrective measures if the radiograph is not of diagnostic quality.		
PARTICIPATION IN AND/OR OBSERVATION OF ROUTINE AND SPECIAL RADIOGRAPHIC PROCEDURES		**0**	**(280)**
Body cavities, shoulder girdle, and upper extremities	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the thoracic cavity. Observe and/or participate in routine radiographic procedures involving the thoracic cavity. Observe and/or participate in the evaluation of thoracic cavity radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized. Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the abdominal cavity. Observe and/or participate in routine radiographic procedures involving the abdominal cavity.		

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in the evaluation of abdominal cavity radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the upper extremities.	
	Observe and/or participate in routine radiographic procedures involving the upper extremities.	
	Observe and/or participate in the evaluation of upper extremity radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the shoulder girdle.	
	Observe and/or participate in routine radiographic procedures involving the shoulder girdle.	
	Observe and/or participate in the evaluation of shoulder girdle radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
Lower extremities, pelvic girdle, spine, and bony thorax	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the lower extremities. Observe and/or participate in routine radiographic procedures involving the lower extremities. Observe and/or participate in the evaluation of lower extremity radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized. Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the pelvic girdle. Observe and/or participate in routine radiographic procedures involving the pelvic girdle. Observe and/or participate in the evaluation of pelvic girdle radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized. Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the spine. Observe and/or participate in routine radiographic procedures involving the spine.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in the evaluation of spinal radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the bony thorax.	
	Observe and/or participate in routine radiographic procedures involving the bony thorax.	
	Observe and/or participate in the evaluation of bony thorax radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
Gastrointestinal, genitourinary, and biliary systems	Observe and/or participate in patient preparation procedures for radiographic/fluoroscopic examinations of the gastrointestinal system.	
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the gastrointestinal system.	
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the gastrointestinal system.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Evaluate the quality of radiographs and photospots of the gastrointestinal system in terms of positioning accuracy, image quality, and anatomical structures revealed.	
	Identify the special considerations for gastrointestinal procedures relating to the avoidance of repeated procedures.	
	Observe and/or participate in the identification of and care for acute reactions to contrast media.	
	Observe and/or participate in patient preparation procedures for radiographic/fluoroscopic examinations of the genitourinary system.	
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the genitourinary system.	
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the genitourinary system.	
	Evaluate the quality of radiographs and photospots of the genitourinary system in terms of positioning accuracy, image quality, and anatomical structures revealed.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Identify the special considerations for genitourinary procedures relating to the avoidance of repeated procedures.	
	Observe and/or participate in the identification of and care for acute reactions to contrast media.	
	Observe and/or participate in patient preparation procedures for radiographic/fluoroscopic examinations of the biliary system.	
	Observe and/or participate in the positioning of patients undergoing radiographic/fluoroscopic procedures involving the biliary system.	
	Observe and/or participate in routine radiographic/fluoroscopic procedures involving the biliary system.	
	Evaluate the quality of radiographs and photospots of the biliary system in terms of positioning accuracy, image quality, and anatomical structures revealed.	
	Identify the special considerations for biliary system procedures relating to the avoidance of repeated procedures.	
	Observe and/or participate in the identification of and care for acute reactions to contrast media.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
Cranial and facial radiography	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving the cranium.	
	Observe and/or participate in routine radiographic procedures involving cranial procedures.	
	Observe and/or participate in the evaluation of cranial radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
	Observe and/or participate in the positioning of patients undergoing routine radiographic procedures involving facial structures.	
	Observe and/or participate in routine radiographic procedures involving facial structures.	
	Observe and/or participate in the evaluation of facial radiographs in terms of positioning accuracy, image quality, and anatomical structures visualized.	
Special procedures	Observe and/or participate in special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngio-pancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in the preparation for use, operation, and maintenance of equipment used to perform special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngiopancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms.	
	Observe and/or participate in the use and maintenance of special radiographic equipment such as image intensifiers, magnification radiographic equipment, biplane equipment, recording equipment, rapid film changers, injectors, program selectors, and other miscellaneous radiographic equipment.	
	Observe and/or participate in the preparation of patients undergoing special minor radiographic procedures such as arthrograms, bronchograms, endoscopic retrograde cholagngiopancreatograms (ERCPs), myelograms, sialograms, venograms, and mammograms/xerograms.	
	Observe and/or participate in the post-procedural care of patients who have undergone special minor radiographic procedures.	

Recommended Outline	After completing this section, the student will:	Hours Class OBI
	Observe and/or participate in the evaluation of special minor procedure radiographs in terms of positioning accuracy, image quality, anatomy visualized, and pathologies revealed.	
	Observe and/or participate in the selection and administration of contrast media used for special radiographic procedures.	
	Observe and/or participate in the diagnosis of and treatment for adverse reactions to contrast media.	
	Observe and/or participate in special radiographic procedures such as cerebral, visceral, peripheral, and digital subtraction angiograms.	
	Observe catheterization techniques.	
	Observe the Seldinger technique.	
	Observe and/or participate in interventional techniques such as infusion therapy, extractions, embolizations, PTA/PTLAs, and percutaneous needle studies.	

Recommended Outline	After completing this section, the student will:	Hours Class	OBI
FINAL COMPLETION OF ALL REQUIRED CLINICAL COMPETENCIES		**0**	**(280)**
Competency completion planning	Develop a plan in conjunction with on-site clinical supervisors and technical institute faculty to outline future completion and mastery of the clinical competencies contained in this and previous clinical courses.		
Continuing education	Identify the benefits associated with participation in continuing education for radiographers. Develop a tentative plan for participation in continuing education for student radiographers.		

SPECIFIC TECHNICAL

RAD 138 - Advanced Clinical Radiography II

Resources

Ballinger, P. W. (1990). *Merrill's atlas of radiographic positions and radiographic procedures* (7th ed.). St. Louis: Mosby.

Bontrager, K. (1987). *Textbook of radiographic positioning and related anatomy* (2nd ed.). St. Louis: Mosby.

Kreel, L. (1980). *Clark's positioning in radiography* (Vol. I). (10th ed.). Chicago: Year Book Medical.

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Meschan, I. (1978). *Radiographic positioning and related anatomy* (2nd ed.). Philadelphia: W. B. Saunders.

Snopek, A. M. (1984). *Fundamentals of special radiographic procedures* (2nd ed.). Philadelphia: W. B. Saunders.

Tortorici, M. R. (1982). *Fundamentals of angiography*. St. Louis: Mosby.

APPENDIX A

APPENDIX A

Radiologic Technology

Equipment List

I. ENERGIZED LAB EQUIPMENT

A. Radiographic table
variable height
flat, floating top
super-speed Bucky
cassette-size sensing tray
12:1, 103 line grid
3 field ion-chamber detector

B. Overhead suspension assembly
telescoping and calibrated suspension for tube unit
two 60' high voltage cables
10' inboard bridge
19' longitudinal rails

C. Automatic collimator
telescoping beam-restricting cylinder

D. High speed x-ray tube and housing
maximum voltage rating 150 kVp
focal spots 0.6 to 1.5 mm
target angle 15 degrees
rotating anode 3" diameter
anode heat storage 300,000 HU
housing heat storage 1,250,000 HU

E. Generator
microprocessor controlled
45 Kw single phase, constant load
maximum output
320 mA at 150 kVp
400 mA at 110 kVp
500 mA at 90 kVp

control console
pedestal mounted
LED display of technique parameters
LED self-diagnostic messages

automatic line voltage compensation
high voltage transformer
solid-state silicon rectified
full-wave rectification

F. Vertical cassette holder
multi-size cassette holder
counter balanced for 14 x 17, 17 x 14, 11 x 14, and 10 x 12 cassettes
automatic collimation
12:1 ratio, 103 line grid 40 - 72" focus

II. INSTRUCTIONAL EQUIPMENT AND MATERIALS

A. Equipment
IBM computer system, printer, monitor, hard disk
2 cardboard cassettes 10 x 12
2 regular cassettes 10 x 12
1 regular cassette 14 x 17
1 regular cassette 11 x 14
1 regular cassette 7 x 17
1 regular cassette 5 x 7
2 extremity cassettes 10 x 12
1 extremity cassette 8 x 10
several grids of different ratios and focus configurations in 10 x 12 sizes if possible
1 screenless cassette 10 x 12
1 complete QA kit including dosemeter, sensitometer, radiation check, and equipment test items
marker set, lend
2 calipers
1 angleometer
1 film ID stamper
1 duplicator/subtractor
1 vertical cassette holder for table
100 film file holders

numerical marking tape for above
1 hot light hand switch
2 lead blockers 7 x 7
1 gonadal shield adult
1 gonadal shield infant
1 infant restraint
full body adult radiographic phantom with innards
thoracic and abdominopelvic phantom with pathology skull phantom
hand phantom
fully articulated adult skeleton
4 seven section skulls
1 adult size head/torso anatomical model, plastic
viewboxes, banks and singles

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